OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND REGION

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C E R T I F I C A T E

This is to certify that the work entitled " OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND REGION " which is being submitted by DR. MAHESH CHANDRA AGARWAL as a thesis for M.S.(Ophthalmology) examination, was carried out in the DEPARTMENT OF OPHTHALMOLOGY, M.L.B. Medical College, Jhansi.

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C E R T I F I C A T E

This is to certify that work entitled " OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND REGION " which is being submitted by DR. MAHESH CHANDRA AGARWAL as a thesis for M.S.(Ophthalmology) examination, was carried out under our personal supervision and guidance. Examination of patients was done by candidate himself and the observations recorded have been checked by us time to time.

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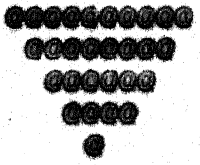


INTRODUCTION

I N T R O D U C T I O N

" Leprosy is most thrilling and exciting adventure on which any medical man can embark ".(Cochrane, 1956).

Leprosy is a disease of antiquity, occurs throughout the world. It manifests itself in the form of a clinical, histological, bacteriological and immunological spectrum (Ridley and Jopling, 1966). The different manifestations of the disease may occur as a result of variations in the host (Turk, 1976) and not because of the variations in the virulence of different strains of Mycobacterium leprae, the causative organism (Rees,1969).

As many as 4 million i.e. almost one third of estimated leprosy patients in the world,live in India. Of these about 75% patients are in the states of Andhra Pradesh, Tamilnadu, Karnataka, Maharashtra, West Bengal and Orissa. Our state Uttar Pradesh has an estimated number of 5 lac patients mainly distributed in Eastern and Bundelkhand regions. In the later the estimated prevalence rate is 5.35 per 1000 population (Nigam et al, 1975). Thus Bundelkhand is an endemic area for leprosy.

Leprosy is not merely an infective disease but is a disastrous ghost. It affects many parts of the body mostly skin, nervous system, reticulo-endothelial

system, eye, nose etc. It progresses slowly destroying the nerves, resulting in deformities, mutilation and debility including blindness, leading to complete holocaust.

Observing this pitiable condition of a large majority of leprosy patients and blind persons and realizing their effect on society, our Honourable Prime Minister Mrs. Indra Gandhi, has included leprosy and blindness control in her ' Revised Twenty Points Programme ' in preference to other diseases prevalent in India.

Association of leprosy to the blindness has been known since long, yet authentic references of eye involvement are not available in ancient literature However, Bull and Hansen (1873) are the pioneers to note the eye lesions in detail caused by leprosy. They described eye involvement in leprosy as very common. They noted that leprosy mainly affects outer parts of eye like cornea and iris and rarely interior of eye i.e. fundus. Punctate keratitis and chronic exudative iritis were very common in their experience. Great frequency of lid and eyebrow involvement was noticed by Lopez (1891). Endogenous infection of uvea was suggested by Jeanselme and Morax (1898). Later on various workers described histopathological, biochemical and clinical changes in eye, caused by leprosy.

The ocular lesions in leprosy may result indirectly from paralysis of the V or VII cranial nerve, or directly because of invasion by the M. leprae (Carrica et al, 1979).

The former is more often seen in tuberculoid form of the disease and the later in lepromatous form. A mixed picture is seen in borderline type of leprosy.

The incidence of involvement of the eye in leprosy has been reported in wide ranges by various authors (Ibid). This frequency varies according to the type and duration of disease. Indian studies also show variations from 11.3 percent ocular lesion in leprosy (Acharya 1978) upto 84 percent (Reddy et al, 1981); (Saxena and Dwivedi, 1971). These studies do not reflect a true prevalence of ocular lesions of leprosy in India. Our vast country has wide regional and racial differences.

An analysis of ocular complications, from available data, shows that the disease almost exclusively affects the anterior segment of the eye. This implies that many of these complications are amenable to therapy and probably preventable. This has been well shown by the work done at Carville and many other centres, particularly in reference to lid problems because of trigeminal or facial nerve paralysis. There remains, however, the major problem

of chronic iritis which seems to develop early & silently in many lepromatous patients and continues relentlessly inspite of conventional therapy. Whatsoever may be the type of eye involvement in leprosy, if it is allowed to progress, it may result in loss of vision. Blindness in an individual who has normal skin sensitivity is enough of a handicap, but in the one, who has lost that faculty, it is disastrous. Few have the resources, material, mental or spiritual to live with it.

This study was undertaken for assessment of the prevalence of various ocular lesions among leprosy patients in Jhansi and surrounding districts, their relationship with the duration and the type of disease and to find out preventable value of regular and controlled treatment of leprosy on the eye involvement.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

I. INTRODUCTION

The word leper is derived from a Greek word meaning scaly or like parchment. Leprosy is a chronic infectious disease primarily affecting the peripheral nervous system and secondarily involving skin, mucosa of mouth and upper respiratory tract, reticuloendothelial system, eyes, bones and testes.

Leprosy has a wide distribution throughout the world and is most prevalent in tropics and subtropics. A recent W.H.O. report suggests that number of leprosy patients are more than 12 millions. About one third of these are residing in India, mostly in Andhra Pradesh, Tamilnadu, Bihar, Maharashtra, West Bengal, Orissa, Uttar Pradesh and Madhya Pradesh. Study area Bundelkhand Region is a part of Uttar Pradesh and Madhya Pradesh. Estimated prevalence of leprosy is 5.35 per 1000 population in Bundelkhand region (Nigam et al, 1975).

The causes of leprosy is an acid fast bacilli, Mycobacterium leprae, which in appearance closely resembles to tubercle bacillus. Susceptibility to leprous infection varies markedly and, therefore,

the entry of M. leprae into the body of an infected person produces different results. Development or non development of the disease and the type thereof, are determined by degree of specific immunity that the infected individual can develop. This degree of immunity is reflected not only in clinical variations of disease but also varying histopathological and bacteriological findings in different forms of disease. Leprosy bacilli have a predilection for neural tissue and whatsoever may be the route of entry into nerves, the target organ is the Schwann cell, the scavenger cell of nerves and the counter part of the histiocyte in the skin. Once bacilli have been engulfed by Schwann cells their subsequent fate and type of leprosy which ensues, depend on the resistance of the infected individual.(Jopling, 1971).

II. TYPES OF LEPROSY

In lepromatous type, which occurs in persons with poor immunity; the bacilli multiply enormously and spread widely in the body, resulting in a progressive and systemic disease with large number of bacilli. In this type, in addition to the skin, nerves and lymph glands involved,there is involvement of eyes, nose, mouth, larynx and various internal organs.

Therefore alongwith skin and nerve lesions various symptoms are produced by involvement of eyes, nose and larynx. In male patients involvement of testicles produces orchitis, testicular atrophy, sterility and gynaecomastia. (Dharmendra, 1978).

In tuberculoid type (Occurring in persons with good immunity), the bacilli can multiply only to a limited extent, this results in the production of a localised, self limiting disease with scanty bacilli. In this type skin and nerve are mainly affected, and tuberculoid granuloma may be found in the regional lymph nodes. The disease is characterised by skin lesions and thickening of affected nerves; the nerve damage may lead to serious deformities and persistant ulcers.

The borderline type, shares the tuberculoid and lepromatous features to varying extents, and therefore symptoms are very pleomorphic.

Leprosy is a chronic disease which progresses and regresses slowly. However, during the long course of disease, there may occur acute bouts of exacerbations generally known as " Reaction ".

There is little doubt that the lepromatous form of leprosy is responsible for the major ocular problems. Indeed it has been said that given enough time,

all patients with lepromatous leprosy will develop ocular complications (Harley, 1946). Tuberculoid and borderline leprosy also cause ocular damage through their effect on the facial and trigeminal nerves. All forms of disease may develop acute iritis with complications, but it is the lepromatous patient that is likely to have long term visual problems which can culminate in blindness.

Lepromatous leprosy is commoner in temperate climates and seems to occur more in Asian, South American and European races rather than Africa. In the Indian subcontinent almost equal balance between lepromatous and non-lepromatous leprosy exists (Miller, 1981). In consequence the main ocular problems due to leprosy are to be expected in the Far East, South America, and the more northerly parts of India and Nepal. From information gained from various ophthalmic surveys in different parts of the world and relating it to global distribution of registered leprosy patients, blind leprosy sufferers in the world are estimated to be 5 lacs - 7.5 lacs (Miller, 1981).

III. HISTORY OF LEPROSY

Leprosy is well known to the various parts of the world since ancient time. Authentic

references to this disease is found in Indian and Chinese literature. Sushruta, the ancient physician (600 B.C.) has given good account of clinical features and treatment of disease 'Kushtha'. References to leprosy are made in two places as 'Vat Rakta ' or 'Vat Shonita' , under the disease of nervous system and 'Kushtha' under the disease of skin. Two kinds of Kushthas have been envisaged, viz 'Kshudra (Minor)-Kushtha'and'Maha-Kushtha'. 'Maha-Kushtha' appears to include conditions corresponding closely with different forms of leprosy. He mentioned Tuvarka (Chaulmoogra or Hydnocarpus) oil and seeds as a potent remedy against leprosy (Dharmendra 1940 & 1947). Charaka, Vagbhata and Manu have also given good account of leprosy in their books.

A reference to leprosy is found in NeiChing (Canon of Internal Medicine), the oldest Chinese Medical treatise, attibuted by Wong to 220 B.C. Ancient Egyptian, Biblical and Buddhist literature mentioned the disease simulating with leprosy.

IV. HISTORY OF OCULAR INVOLVEMENT

Association of leprosy to the blindness has been known since long, yet authentic references of eye involvement are not available in ancient literature.

However Bull and Hansen (1873) are the pioneer to describe in detail the eye lesions caused by leprosy. They found eye involvement in leprosy as very common and noted affection of leprosy commonly towards cornea and iris and rarely to the interior of eye, ie. fundus. Great frequency of lid and eyebrows involvement was noticed by Lopez (1891). Endogenous infection of uvea was suggested by Jeanselme and Morax (1898). These studies, however, were done prior to introduction of slit lamp and only gross lesions were described. Later, clinico pathological observations with the aid of slit lamp and microscope by Fuchs (1937), Shiomma (1938) de Barros (1940), Valle (1946), Elliot (1951), Kirwan (1955), Choyce (1959 & 1964), Allen and Byers (1960), Allen (1966), Ffytche (1981) and many other workers had added much into the knowledge of pathogenesis and clinical manifestations.

Lepromatous changes in iris, as seen in electrone microscope have been published by Hashizuma and Shâonuma (1965). They noted the presence of Mycobacterium leprae in the smooth muscle cells of iris. Schwartz(1965) measured the temperature gradients in rabbit eye and found a difference of 6°C between the temperature of the corneal surface and the orbit, with a steady gradient

throughout the ocular tissues. Sabin (1969) observed that leprosy bacilli preferentially attack the coolest parts of the body - the skin of extremities, nose, ears, testis and outer part of eye. Prabhakaran (1971) observed that Mycobacterium leprae rapidly exidises DOPA and produces quinones. These quinones interact with the proteins of lens, leading to cataractous condition.

Swift (1972) studied pupillary reaction in lepromatous leprosy patients.

Hobbs et al (1978) demonstrated anterior segment involvement by M. leprae in experimental animals. Development of an experimental animal model ought to prove a turning point in the understanding of ocular pathology in leprosy (Ffytche, 1981).

V.MECHANISM OF OCULAR INVOLVEMENT IN LEPROSY

The ocular lesions in leprosy may result indirectly from paralysis of the V or VII cranial nerves or directly by invasion by the M. leprae (Corrica et al, 1979). The former is more often seen in tuberculoid form of the disease and later in lepromatous form. A mixed picture is seen in borderline type of leprosy. However, ocular damage in leprosy occurs in 4 ways : (A) Facial and Trigeminal nerve involvement (B) Hypersensitivity reactions (C) Direct bacterial invasion (D) Secondary infection (Ffytche 1981).

(A) Facial and trigeminal nerve involvement

Leprosy is essentially a neural disease with infection and eventual destruction of superficial nerves by M. Leprae. The anatomical position of the facial nerve, especially the zygomatic branch, and the superficial branches of the trigeminal nerve make these structures vulnerable to infection in all forms of leprosy. A combination of these 2 nerve palsies may abolish the normal blink and corneal reflexes and lead to exposure keratitis. With its subsequent corneal damage and opacification. The incidence of these major corneal problems is however, less than might be expected since preservation of normal Bell's phenomenon prolongs the protection of the cornea (Emiru 1970). Even so, facial palsy has been considered to be the second commonest cause of blindness in leprosy (Krassai 1970).

(B) Hypersensitivity reactions

In all forms of leprosy but particularly when a change in polarity occurs, a hypersensitivity reaction can take place. The clinical manifestations are believed to be caused by circulating immune complexes becoming deposited in the affected tissues (Grove et al 1976, Hobbs et al 1978) rather than a response to bacteria. The eye develops an acute iritis which is usually bilateral. M. leprae have been demonstrated in the anterior chamber by paracentesis (Michelson et al 1979) but it is not known that role they play in the pathogenesis of acute uveitis.

(C) Direct Bacterial Invasion

Direct bacterial invasion occurs only in lepromatous leprosy. It is now considered by most authors to take place as a result of a bacteraemia following infection (Harley 1946; Drutz 1972), although some spread may occurs from infected lacrimal and nasal passages (Holmes 1957) though this method of spread may be rare (Choyce 1972).

(D) Secondary Infection

Loss of corneal sensitivity, poor nutritional control, and exposure and diminished tear production all combine to make cornea susceptible to secondary bacterial, viral and fungal infections. The additional destruction of the nose and nasolacrimal passages in advanced cases increases the local reservoir of pathogenic organisms.

VI. OCULAR PATHOLOGY

Loss of eyebrows and eyelashes is due to infiltration of hair follicles. They degenerate and tend to turn white and splinter and then to fall out (Duke-Elder 1966) leading to alopecia and madarosis.

Skin of supraciliary region become thickened in lepromatous and borderline leprosy due to infiltration of skin.

Pathology of lid lesions is the same as the skin of other parts. Usually a diffuse infiltration begins in the intramarginal area, extending through the tarsal plate becoming visible to conjunctival surface. This lid infiltrate causes destruction of elastic and connective tissue leading to the flaccid entropion and consequent trichiasis (Harrel 1977).

Involvement of lacrimal sac in leprosy occurs both by direct infection of the sac or infection extending from nasal mucosa. Atresia may develop owing to destruction and deformities in the surrounding structures (King, 1936). Involvement of lacrimal gland is due to almost universal distribution of bacilli (Amendola 1944).

Involvement of orbicularis oculi in leprosy is due to paralysis of the superficial branches of facial nerve. However Slem (1971) found leprous myositis on histopathological examination of orbicularis oculi muscle and stated that leprous myositis is also a contributory factor for lagophthalmos. Conjunctival mucosa is remarkably immune to leprous infection, however leprosy bacilli may be found in the conjunctival sac of leprosy patients. Chronic catarrhal conjunctivitis with papillary hypertrophy may develop in leprosy patients (Harley 1946). Indeed it has

been said that true leprous conjunctivitis does not exists (Aparisi 1950, Somerset 1962).

Frequent early involvement of cornea is due to the fact that capillary and lymphatic networks are more at limbus corneae similar to those of skin, flow is slow and venous pressure is low making ideal conditions for fixation of leprosy bacilli (Hibi 1956). The transitory opacity of corneal nerves is due to oedema of nerves accompanying the localization, multiplication of bacilli in or adjacent to the nerves. Plasma cells and lymphocytes aggregate around the nerves giving the appearance of beading. After a few weeks the cells migrate out and the opacity disappears(Allen 1960). Superficial punctate keratitis in leprosy is an infiltration by mononuclear cells i.e. plasma cells, lymphocytes and epithelioid cells just beneath the Bowman's membrane or between Bowman's membrane and epithelium. These cells remain in clustures and clusture increases in number and size by accumulation of more cells. The individual lepra cells may continue to increase in size by multiplication of organism and also by engulfing the adjacent lepra cells (Allen 1960). Superficial punctate keratitis may progress to form a circumferential pannus or an interstitial keratitis (Ffytche 1981).

In interstitial keratitis, the inflammatory infiltrates extend into the connective tissue cells in various layers of stroma. In leprotic pannus newly developed capillary extend from the limbic loops into the superficial layers of the cornea between the Bowman's membrane and epithelium.

Other forms of corneal disease and opacification occur as a result of exposure and neuroparalytic keratopathy and include band shaped keratopathy and various degenerative conditions.

Iris

Pathologically leprous lesions of uveal tract corresponds to these seen elsewhere in the body- a granulomatous infiltration of lymphocytes, large number of monomuclear phagocytes, fibroblasts and occasional polymorphonuclear cells are seen which may lead to extensive areas of necrosis. The mononuclear phagocytes are often packed with bacilli, when cytoplasm becomes swollen and frothy to become foam or lepra cells.

Characterstic and pathognomonic feature of leprosy in iris is the formation of miliary leproma, the pearls. Alongwith early localization of the organism in the iris, a number of mononuclear cells appear in the

in the stroma. These increase in size by multiplication of organism and engulfing the adjacent lepra cells forming colony of acid fast bacilli. The globi enlarge slowly, graduàlly pushing the nucleus towards and compressing it against the cell wall. Some of these become visible clinically as pin point dots at this stage. Usually two or more similar cells come into contact coalesce and form a giant foam cell. Which continue to grow slowly throughout the life of patient (Allen 1966). The pearl, in addition to living organism contains considerable lipid material, cellular debris and some calcium salts.

VII. PREVALANCE OF OCULAR INVOLVEMENT

Prevalence of ocular complications and blindness is difficult to determine (Miller 1981). Frequency of ocular involvement in leprosy varied grea in different reports from different parts of the wo It depends upon the race, climate, type of leprosy, reaction of leprosy, duration of disease and duration of treatment along with regularity and type of treatment. Patient's general health, nutritional status and presence of other diseases also affects the ocular involvement.

Interpretation of what constitutes ocular involvement may vary with different investigators.

Some investigators included non lepretic eye lesions in their results while other had excluded them. Some studies were performed in the remote areas, where slit lamp examination facility was not available. Moreover some investigators reviewed hospital charts, in which significant observation may have been omitted. Study performed in pre-sulphone era or post-sulphone era also had effect on the frequency of ocular involvement (Sheild 1974). It has been stated that given enough time almost all patients of lepromatous leprosy will develop ocular involvement (Harley 1946).

Frequency of ocular involvement has been reported as high as 91% in U.S.A. by Prendergast (1940); 90% in Panama by Harley (1946); 94% in Egypt by Wasfy (1971); 70% in Vietnam by Hornblass (1973); 72% in Brazil by Sheild (1974). On the other hand a low figure of only 10% has been reported in Central Tanganyika by McLaren (1963) and also in South Korea by Holmes (1957).

Even in India, prevalence of ocular lesions reported has varied viz 84% by Reddy and Subrahamanyam (1981); 25% by Sehgal and Agarwal (1976) and 11.7% by Acharya (1978).

VIII. DISTRIBUTION OF OCULAR LESIONS

(A). Ocular Adenexa

Prevalence of complete or partial loss of eyebrows varied from 13% to 100% (Chaterjee and Chaudhary 1964; Richard 1969; Wasfy 1971. Prevalence of loss of eyebrows is much common in lepromatous than borderline and tuberculoid leprosy. In most of countries where disease is endemic, loss of eyebrows is so frequent that it is one of the best known stigmata recognised by physicians and laymen alike. Why loss of eyebrows start from the lateral side, is not clear.

Loss of eyelashes is also common in lepromatous type of leprosy.Frequency of loss of eyelashes has been reported 44% by Sheild (1974); 15% by Wasfy (1971) and only 1% by Chatterjee and Chaudhary (1964). Loss of eyebrows and eyelashes is characterstic but not pathognomonic of leprosy (Sheild 1974). Other causes of loss of eyebrows and eyelashes are thyroid disease, Hypopituitarism, Chronic blepharitis, Chronic epinephrine therapy, Vogt Koyanagi Harada syndrome and certain intoxications.

Entropion is a complication of leprosy about which little has been written in the past. McLaren et al (1961) seems to be first to record the occurence

of entropion in leprosy. Richard and Arrington (1969) also mentioned entropion as a sign of leprosy. In leprotic entropion, there is no scarring of conjunctiva as seen in trachoma (Emiru 1970). Due to infiltration of lid skin and tarsal plate direction of eye lashes become irregular in leprosy patients. Frequency of trichiasis has been reported by various workers as, 1% (Sheild, 1974); 3% (Chatterjee and Chaudhary, 1964) and 8.2% (Emiru, 1970).

Skin of supraciliary region become thickened due to the leprous infiltration. Frequency of this lesion varied from 7% to 29% (Harrel 1977; Sheild 1974).

Prevalence of lagophthalmos has been reported as high as 36% in tuberculoid leprosy and 32% in lepromatous leprosy by Malla et al (1981) 30% in tuberculoid and 6% in lepromatous by Choyce (1972). Other workers have reported lower prevalence of lagophthalmos in leprosy patients (McLaren 1961; Dethlefs 1981).

Sheild et al (1974) has reported 2 cases of frontalis palsy along with orbicularis oculi paralysis. Out of 13 patients with lagophthalmos, only 3 patients had exposure keratitis. In rest of the patients cornea was normal due to Bell's phenomenon (Sheild 1974).

Lacrimal system involvement has been reported by only few workers. Weerekoon (1969) in Ceylon found 14 cases of lacrimal obstruction among 297 cases of leprosy with ocular involvement. Emiru (1970) found only one case of lacrimal obstruction among 890 patients.

Atkinson (1934) reported a case of nodular leprosy wherein rapid hypertrophy of gland lead to its dislocation.

Cochrane (1940) reported involvement of lacrimal gland in a case of tuberculoid leprosy and assumed it as allergic response of lacrimal gland same to the skin and mucous membrane.

(B) Conjunctiva, Episclera and Sclera

Involvement of conjunctiva is not common in leprosy patients. Malla et al (1981) have reported 9.8% conjunctivitis among lepromatous leprosy patients and 3.8% conjunctivitis in the tuberculoid leprosy patients. Weerekoon (1969) reported 10.5% prevalence of conjunctivitis among leprosy patients (type not specified). The conjunctivitis in leprosy patients is not specific.

Prevalence of scleritis and episcleritis have been reported 11% in Ceylon by Weerekoon (1969); 5% in Brazil by Sheild (1974); 1% in Ghana by Chatterjee and Chaudhary (1964).

Episcleral nodules, however, are the characteristics, found to be very infrequent 0.5% (Emiru 1970). These begins as an oval slightly elongated, yellowish pink mass alongside the lower limbus. The adjacent cornea is eventually affected with a sclerosing keratitis (Weerekoon 1969).

(C) Cornea

Prevalence of corneal involvement varied greatly fromm worker to worker, ranging from 90% in Hawaii (Pinkerton, 1927) to 1.6% in Uganda (Emiru 1970). Hornblass (1973) observed 80% corneal involvement. It also varied in different races. Low prevalence of ocular lesion was seen in Bantus and significantly higher among Europeons in Africa, a finding parallel in India when native Indians are compared with Europeons.

Transitory opacification of corneal nerves was observed in both tuberculoid as well as lepromatous leprosy along with beading or sheath like formation on corneal nerves. (Minder 1929). The nerves in the upper temporal quadrants are the first to be involved but, several nerves in each or any quadrant may become opaque either as on initial or as an recurrent phenomenon (Allen 1960).

Punctate keratitis forms a pathognomonic picture unlike any thing else (Hansen 1873). It is also commonest manifestation of the disease in eye (Hibi 1956). It appears as minute white spots irregular in outline, looking like grains of chalk are scattered (Duke-Elder 1966). This condition do not give rise to pain or any subjective symptom and may remain unnoticed until its progress toward centre of cornea causing blurring of vision.

As the active inflammation of cornea subsides, the thin greyish white diffuse opacity may disappear or may persist, but the chalky white punctate opacities remain permanently (Allen 1960). On the other hand it may persist or progress deeply to form an interstitial keratitis or vessels from limbus may grow to form pannus. Chalky white opacities may also increase in size and become spherical or globular. They become visible grossly and are termed miliary lepremata (Allen 1960).

Interstitial keratitis usually occurs as sequelae to involvement of ciliary body or as an extension of limbal nodule. This condition is frequently bilateral and commonest site is the upper and outer quadrant. It may be accompanied by circum corneal congestion but interstitial vascularization is scanty and late.

(D) Iris

Prevalence of iris involvement in leprosy patients is found to vary greatly from 91% (Prendergast, 1940) to only 3% (Chatterjee and Chaudhery, 1964). Cheyce (1972) in Malawi found iridocyclitis in 24% cases. Iris is mostly involved in lepromatous type of leprosy 40.6% than tuberculoid type of leprosy 7.2% (Malla et al, 1981).

Acute diffuse iritis, whether or not, associated with lepra reaction, is rarely insidious in onset. In majority of cases it is characterized by a sudden, violent onset with development of intense inflammatory symptoms. Clinically it differes in no way from a non specific acute inflammation of iris (Mendonca de Barros 1940). If untreated, the eye can be permanently damaged within 24-72 hours (Cheyce 1972). Aqueous flare and cells, keratic precipitates, hypopyon and synechiae with seclusio pupillae and secondary glaucoma can occur with secondary cataract and eventual phthisis (Ffytche 1981).

In sub acute or chronic diffuse iritis acute inflammatory symptoms are absent or almost so. (Weerakoon 1969). Occasionally they are diagnosed only by slit lamp examination; at other times the patient comes to the clinic complaining only of slight dullness

of vision. In these cases very discrete ciliary congestion develops which is sometimes almost inperceptible. Corneal oedema is always present but of less intensity. The Tyndall phenomenon of aqueous is not very marked. Floating corpuscles are visible sometimes in limited number , K.Ps. are not a usual feature in these cases (Weerekoon 1970). The pupil is little dilated showing less reaction to light than the opposite eye. (Mendonca de Barros 1940).

The pupil margin appears to be irregular and small adhesions between the edge of pupil and anterior surface of lens can be seen. Gradually a small amount of plastic exudate covers the centre of anterior surface of the lens in the area of small pupil leading to serious loss of vision. Unfortunately chronic diffuse iritis was found to be the most common blinding lesion in leprosy patients (Hobbs & Choyce 1971).

Specific type of iris atrophy has been reported by Slem ,(1971). It is characterized by patchy degeneration and disappearance of iris stroma, followed by loss of epithelium and hole in the iris. Sheild (1974) also reported 2 cases of specific iris atrophy and 3 non specific perpupillary atrophy among 100 leprosy patients. Ffytche (1981) reported gross atrophy of

dilater muscle of iris as common as 7.3%. He suggested dilater is thin and spread throughout the iris and its consequent atrophy gives rise to the increased friability of the tissue and persistence of troublesome miosis.

Miliary or nodular iritis is the main pathognomonic lesion of leprotic involvement of iris. In this pearl like granulations observed near the sphincter in the deep mesodermic layers (Mendonca de Barros 1940). They are extremely small about 0.5-1.0 mm in diameter dull yellow in colour and round in shape. Very often there is no sign of inflammation. These lesions remain unchanged for years or may disappear after some months leaving non trace or alternatively small areas of atrophy (Valettas 1916). Which indicate that eyes tolerate them well. These miliary nodules do not interfere with vision and pupil reacts to light more or less normally. Sometimes they attain a large size and fall off into the angle of anterior chamber. Where they are absorbed (Allen 1966). They are considered to be exudative in nature (Kirwan 1927).

Swift (1972) studied the pupillary reaction in patients of lepromatous leprosy and observed miosis of pupil alongwith sluggish reaction to light.

(E) Cataract

Direct invasion of the lens by bacilli has never been demonstrated and many authors consider that there is no true leprosy cataract and that the lens changes are those seen in a normal aging population (Prendergast 1940; Weerekoon 1969). A secondary cataract may certainly develop after the acute iritis associated with hypersensitivity but some authors acknowledge a higher incidence of secondary cataract following chronic iritis (Harley 1946; Choyce 1969). Possible cause for cataract in lepromatous leprosy was suggested by Prabhakaran (1971) who noted that the leprosy bacilli reacts with DOPA which is normally found in iris and ciliary body. This reaction produces high local concentrations of quinones, which are known to be cataractogenic.

Cataract was found to be the common cause of blindness 23.9% in leprosy patients (Malla et al 1981).

(F) Fundus

A difference of opinion exists as to leprotic manifestations in the posterior segment of the eye. Examination of the fundus in leprosy patient with well advanced disease is difficult partly because of constricted pupil with posterior synechia or occlusio pupillae and partly because of haziness caused by corneal

lenticular or vitreous opacities, Malla et al (1981) have reported non specific changes in the fundus of leprosy patients.

Some observers consider that the choroid is immune apart from the spread of disease directly from ciliary body, particularly in lower temporal quadrant. Franke and Delbance (1900) Choyce (1959). The choroidal lesions may be unilateral or bilateral and appear as white, isolated, atrophic or sear like areas with some pigmentary proliferation. They may bef few or numberous varying in size from pin head to a disc diameter. The smaller punctate lesions resemble the miliary lepromata seen on the iris (Trantas 1899; Elliot 1949; Somerset 1962). Some workers have reported a picture of typical disseminated choroiditis (Pinchet 1929; Hoffmann 1929; Slem 1971) and named it as choroiditis leprosa precox. They thought it to be a sign of latent leprosy.

Retinal involvement in leprosy is rare and when it does occur it is usually secondary to an infection of uveal tract (Trantas 1899). Very rarely wide spread inflammatory changes may be seen on retina. Pearl like nodules were detected (Elliot 1949) These lepra pearls may be seen as small waxy or creamy white pedunculted nodules lying superficially on the retina and

projecting into the vitreous. Usually they are in the peripheral fundus, so near the ora that their ophthalmoscopic observation is difficult (Somerset 1956).

(G) Intraocular tension

Only few workers have reported change in Intraocular tension (IOT) in leprosy patients. Slem(1971) performed tonometric examination of 38 eyes and found abnormally low pressure. Tonographic studies of 49 eyes showed that aqueous production and drainage were diminished in leprosy patients. Brandt et al (1981). Observed that chronic plastic iridocyclitis reduces IOT in lepromatous as well as in tuberculoid leprosy patients. Sheild et al (1974) found glaucoma in 12% cases, however these cases were diagnosed on the basis of glaucomatous cupping not on the basis of elevated I.O.T.

(H) Visual Acuity

Prevalence of blindness have been described by most of the workers in their studies, yet details of visual acuity has not been given by any of the worker. Similar to the prevalence of other ocular lesions prevalence of blindness varied considerably. Malla et al (1981) recorded 13.9% cases of tuberculoid leprosy and 26.1% cases of lepromatous leprosy with their vision / 6/60. While Harrel (1977) has recorded 50% cases visual

acuity /6/60 in CanalZone. Visual acuity /3/60 has been recorded in 1.3% cases in uganda (Emiru 1970), 13.6% cases in Ceylon (Weerekoon 1969). 5.8% cases. Northern Ghana (Chatterjee and Chaudhary 1964).

However Reddy and Subrahmaniyam (1981) in a study in Kakinanda (India) found 5 cases of lepromatous leprosy and 3 cases of tuberculoid leprosy having vision /6/60 among 100 cases of leprosy.

Apart from non leprotic lesions like trachoma, vit.A deficiency and other eye diseases five main causes of blindness has been mentioned in leprosy patients. These causes many operate singlyor together (Choyce 1959). In order of importance they are, chronic iridocyclitis, lagophthalmos associated with corneal anaesthesia, leprous keratitis, acute iridocyclitis, and presence of intercurrent eye disease like senile cataract and chronic simple glaucoma.

MATERIAL AND METHOD

MATERIAL AND METHOD

MATERIAL

Patients attending leprosy clinic at M.L.B. Medical College, Hospital, Jhansi were the subject of this study. Almost all the patients attending the clinic on a particular day were included in the study.

These patients were of all age groups and belonged to Jhansi district and nearby districts of Uttar Pradesh and Madhya Pradesh forming the Bundelkhand region. A total of 180 patients attending the clinic between June 82 to April 83 were included in the study. Diagnosis of leprosy was confirmed by the dermatovenereologist on clinical features supported by histopathology and slit & smear examination.

The area of study, Bundelkhand region spread over two states of Uttar Pradesh and Madhya Pradesh (Fig.1), is located between 23° 10' and 26° 30' North Latitude and 78° 21' and 81° 40' East longitude. The region covers a total geographical area of 70,000 Sq.Km. including eleven districts five of which viz. Jhansi, Lalitpur, Jalaun, Hamirpur and Banda are in Uttar Pradesh and remaining six district viz. Datia, Tikamgarh, Chhatarpur, Panna, Damoh and Sagar in Madhya Pradesh (Fig. 2).

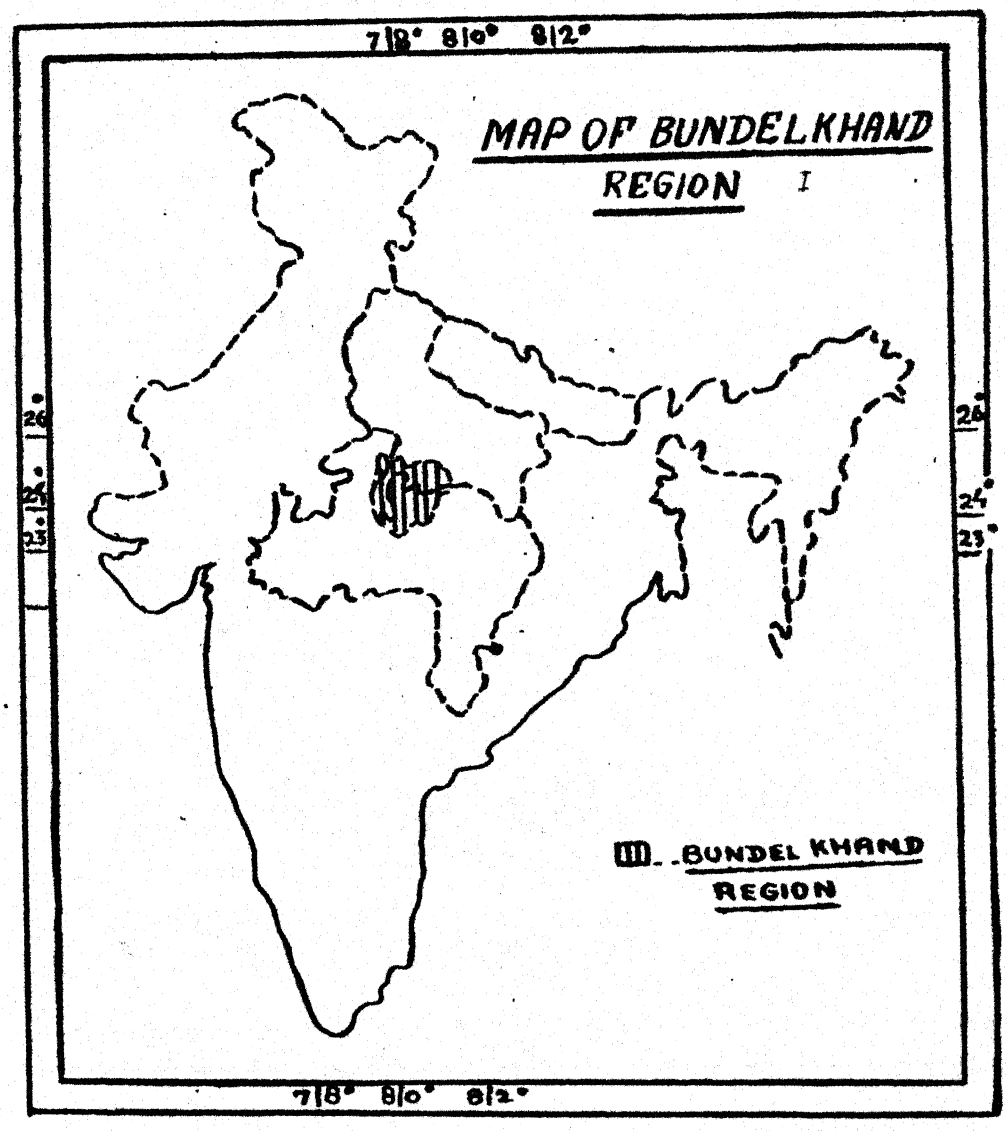

7|8° 8|0° 8|2°
MAP OF BUNDELKHAND
REGION I
26°
25°
24°
23°
III. BUNDEL KHAND
REGION
7|8° 8|0° 8|2°

Fig. 1

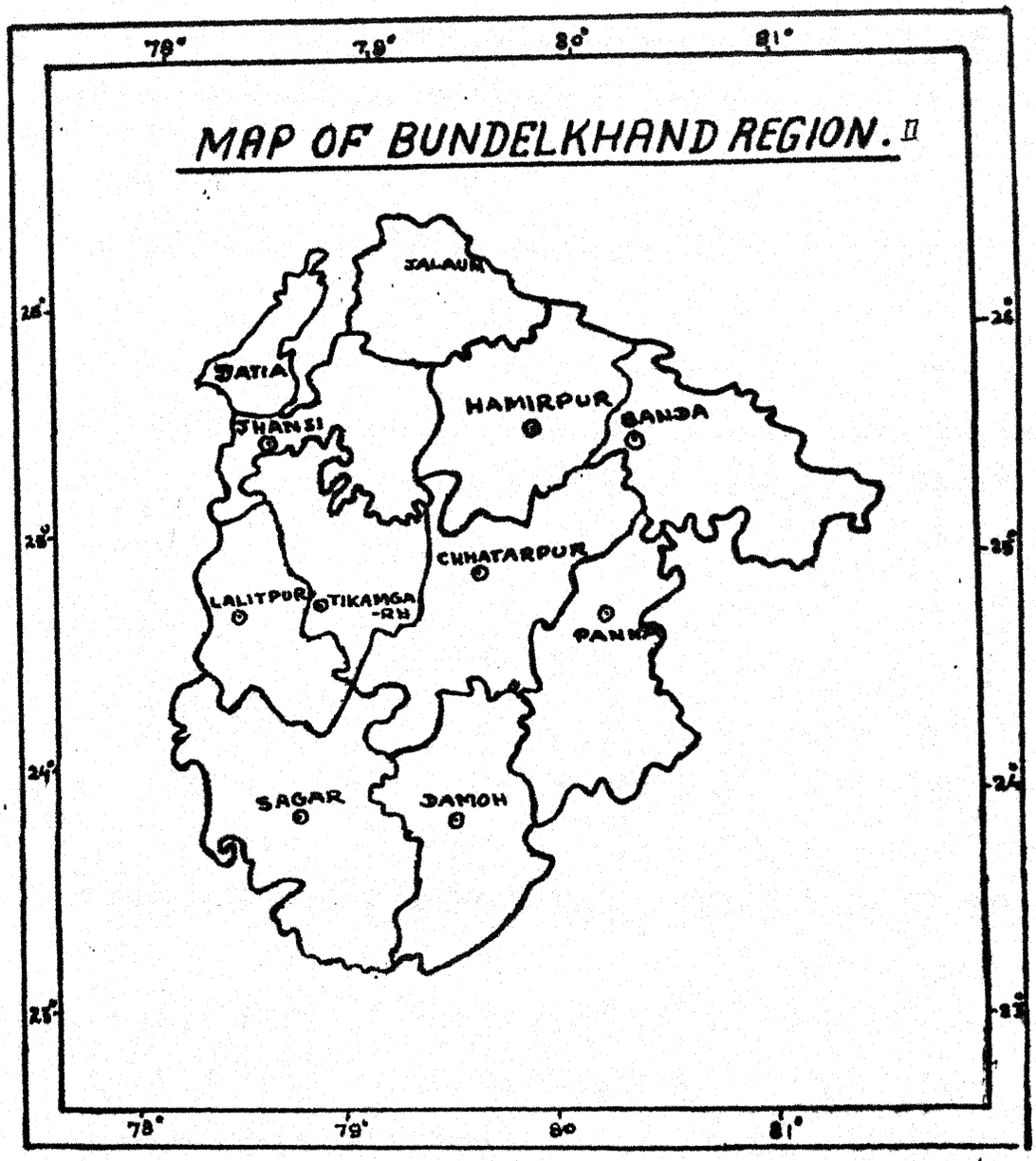

MAP OF BUNDELKHAND REGION. II
78°
79°
80°
81°
28°
26°
24°
JALAUN
DATIA
JHANSI
HAMIRPUR
BANDA
CHHATARPUR
LALITPUR
TIKAMGA-RH
PANNA
SAGAR
JAMOH

Fig. 2

The region represents a transitional zone of tropical dry subhumid in the east to tropical semiarid in the west. The overall mean annual temperature of the region is high and varies from 25-26°C.

METHOD

Details of the findings of each patient were recorded on a proforma (Annexure -I). General information of patient along with duration of disease, duration of treatment, regularity of treatment, type of treatment and its reaction were recorded. Ocular history was recorded in detail.

Salient features of leprosy as hypopigmented patches, nerve thickening hypoaesthesia or anaesthesia of any part of body and deformities of face, hands and feet were noticed. Leprosy was classified according to Ridley and Jopling (1966) system, but broadly grouped into 3 types i.e. Tuberculoid included TT and BT, Borderline included BB, Lepromatous included BL and LL. Types of reaction - type I and type II were also noticed.

Examination of Eye:- Following procedure was adopted for the examination of eye: Record of visual acuity,

diffuse light examination, focal illumination, tonometry and funduscopy.

I. Visual Acuity

Visual acuity was recorded with Snellen chart placed at 6 meter distance. Hand movements, perception of light and projection of rays were recorded in patients with much diminished visual acuity.

II. Examination under diffuse light

Eyes were examined externally under the diffuse light of a well focussed ordinary torch. Face was examined for any gross deformity and for the function of frontalis and orbicularis oculimuscles.

Lacrimal system was examined for any sign of acute or chronic dacryocystitis, dacryoadenitis. Pressure regurgitation test was done in every case and was followed by syringing, if thought necessary.

Eyebrows were examined for complete or partial loss, nodules, and thickening of the skin of supraciliary region.

Lid and eyelashes were examined for partial or complete loss, regular or irregular pattern. Lid margins were examined for drooping of lid and inrolling or outrolling of lid margin.

Conjunctiva was examined for acute or chronic conjuctivitis and nodule. Non specific changes such as pterygium, pinguecula, and xerosis were also noted.

Selera was examined for lepromatous nodules, non specific scleritis, episcleritis, and ciliary staphyloma.

Cornea was examined for superficial, interstitial and exposure keratitis. Vascularisation of cornea, opacity and ulcer were also noted. If ulcer was suspected it was confirmed by staining of cornea with 2% fluorescein. Corneal sensation was also tested with cotton wisp.

Anterior chamber was examined for its depth and contents, especially to find out keratic precipitates, flage or iris pearl.

Iris was examined for colour, surface, pattern and any nodular growth on it. Synechiae and atrophy were also seen.

Pupil was examined for size, shape, and reaction to light. Pupillary reaction was considered to be normal if pupil constricted briskly with 4-5

oscillations and fixed in the constricted position.

Lens were examined for any opacity or pigmentation over its anterior capsule.

III. Examination under local illumination

Slit lamp examination of each case was done on G. Rodenstock instrument (Munchen Hamburg - Germany) in a semidarkened room, in ophthalmic department. Patient was made to sit on stool and fix his head in a proper position. All the structures of anterior eye were examined by various methods of illumination, i.e. diffuse illumination, sclerotic scatter, direct focal illumination, direct and indirect retro illumination, zones of specular reflection and indirect illumination.

Details of the lesions of lid, conjunctiva, cornea, anterior chamber, iris and lens were noted. Special attention was given to find out early punctate keratitis and iris pearl.

IV. Tenometry

Tension was recorded with Schiotz's tonometer in all the patients under surface anaesthesia (4% xylocain) unless, contraindicated.

V. Funduscopy

Examination of fundus was done with direct ophthalmoscope (Keeler's practitioner). Pupils were dilated

widely with Drosyn (10% phenyl ephrine hydrochloride). Details of the specific or non-specific lesions in the fundus were noted.

OBSERVATION

OBSERVATION

The present study was carried out on 180 leprosy patients, attending the leprosy clinic in the Skin, V.D. and Leprosy department of M.L.B. Medical College, Hospital, Jhansi. Out of total 180 patients, 84 were having lepromatous leprosy, 62 were having tuberculoid leprosy and 34 were having borderline leprosy (Fig.3) A total of 102 (56.7%) patients were observed to have ocular involvement, 72(40.0%) had leprotic eye lesions and 30 (16.7%) had other eye lesions probably not related to leprosy. (Table 1, Fig. 4).

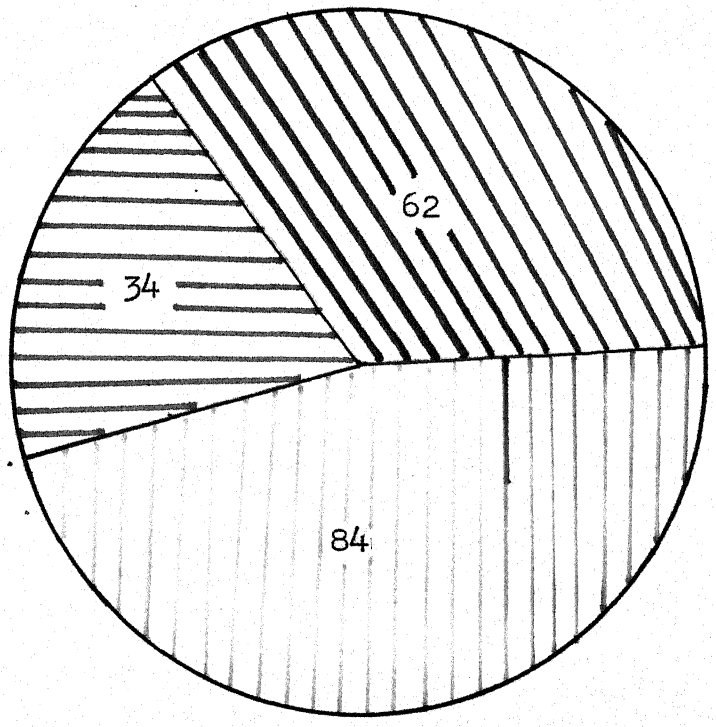
Table 1

INVOLVEMENT OF EYE IN LEPROSY

	Leprosy patients under study	Patients with eye lesions		Patients without eye lesions
		Leprotic lesions	Non leprotic eye lesions	
Total number	180	72	30	78
Percentage	100	40	16.7	43.3

It was also observed that prevalence of ocular lesion was highest in lepromatous leprosy(72.6%) and lowest in tuberculoid leprosy (40.3%). Borderline

Fig. 3 DISTRIBUTION OF PATIENTS ACCORDING TO TYPE OF LEPROSY

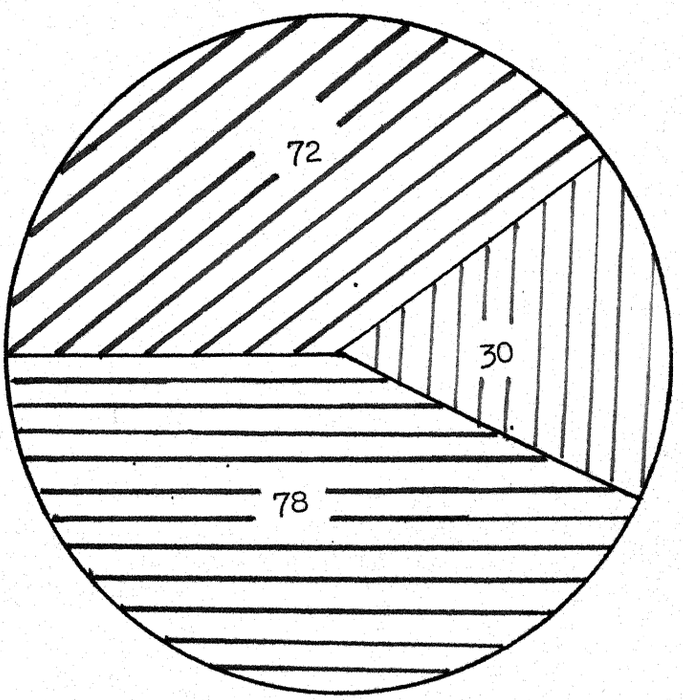


Tuberculoid

Borderline

Lepromatous

Fig. 4 PREVALENCE OF OCULAR MANIFESTATIONS OF LEPROSY

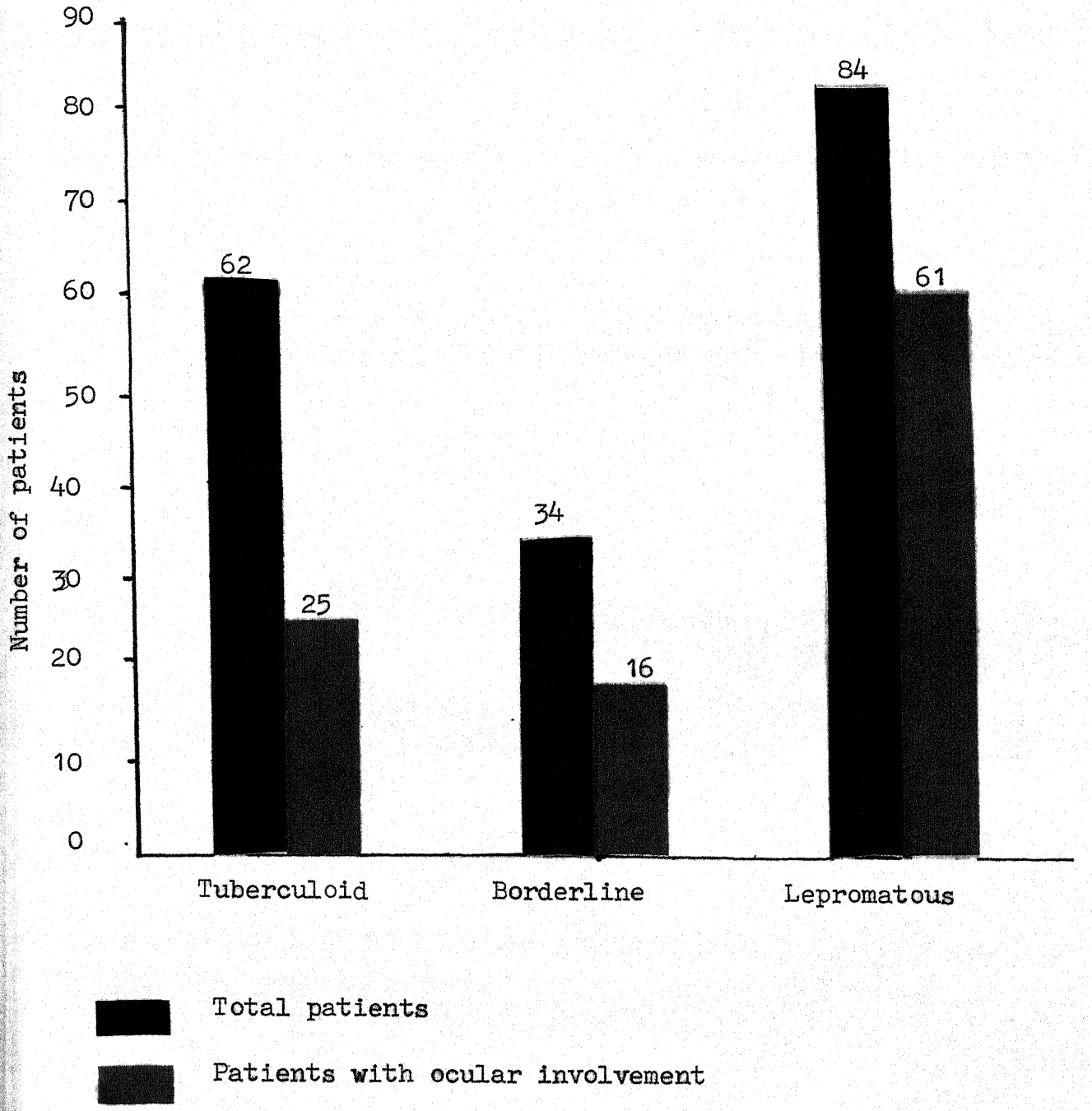


No Eye Lesion

Leprotic Eye Lesions

Non Leprotic Eye Lesions

Fig. 5 OCULAR INVOLVEMENT IN VARIOUS TYPES OF LEPROSY



leprosy was found to have prevalence of ocular lesions (47.06%) in between the two polar types of leprosy. (Table 2 Fig.5).

Table 2

PREVALENCE OF OCULAR LESIONS IN DIFFERENT TYPES OF LEPROSY

	Tuberculoid	Borderline	Lepromatous	Total
Number of patients	62	34	84	180
Number of patients with ocular lesions	25	16	61	102
Percentage of patients with ocular lesions	40.3	47.0	72.6	56.7

X^2 = 16.72
p < 0.001 (Highly significant)
degree of freedom - 2

Relationship of various eye lesions with demographic variable (viz - age, sex, marital status, occupation, socioeconomic status and rural - urban inhabitance), duration of leprosy and duration of treatment alongwith regularity of treatment were studied and presented in details.

Age and Sex

Distribution of the leprosy patients according to their age and sex is shown in table 3 Fig. 6 & 7. Leprosy patients were in the range of 5-78 years of age with mean age 41.56 years. Majority of patients 150(83.3%) were between 3rd and 6th decade of their lives. Only 3 (1.6%) patients were below the age of 10 years and 12 (6.66%) were above the age of 60 years. Less than a quarter of leprosy patients included in the study were females 42(22.2%) with almost same age distribution.

Table 3

DISTRIBUTION OF LEPROSY PATIENTS BY AGE-SEX AND TYPE OF LEPROSY

	Tuberculoid		Borderline		Lepromatous		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
0 -10	-	-	-	2	1	-	1	2
10-20	4	2	1	1	6	1	11	4
20-30	14	2	7	1	14	3	35	6
30-40	8	7	4	5	15	1	27	13
40-50	10	2	3	3	16	1	29	6
50-60	9	2	4	2	13	4	26	8
60-70	-	2	1	-	7	1	8	3
70-80	-	-	-	-	1	-	1	-
Total	45	17	20	14	73	11	138	42

Fig.6 DISTRIBUTION OF LEPROSY PATIENTS ACCORDING TO THEIR AGE

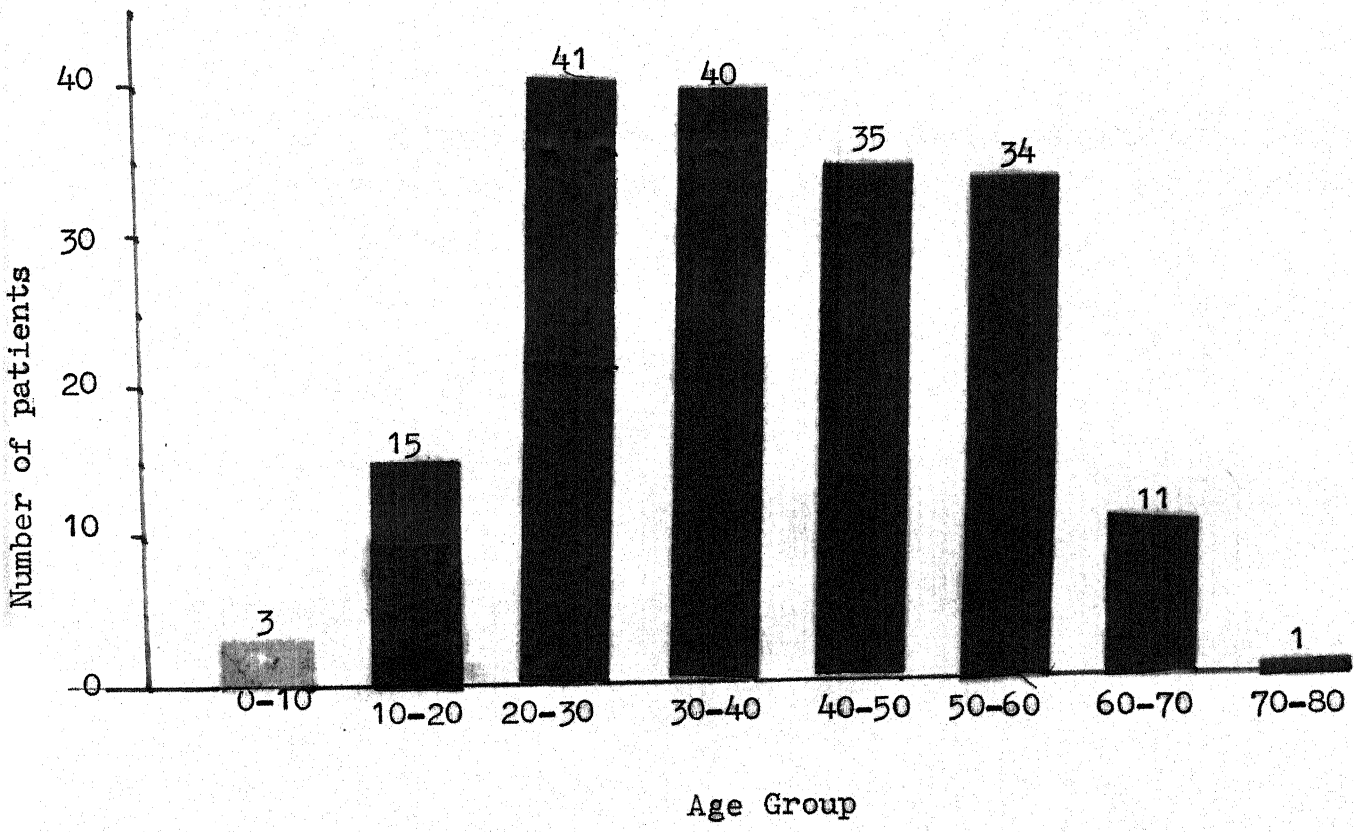


Fig.7 DISTRIBUTION OF PATIENTS ACCORDING TO THEIR SEX AND TYPE OF LEPROSY

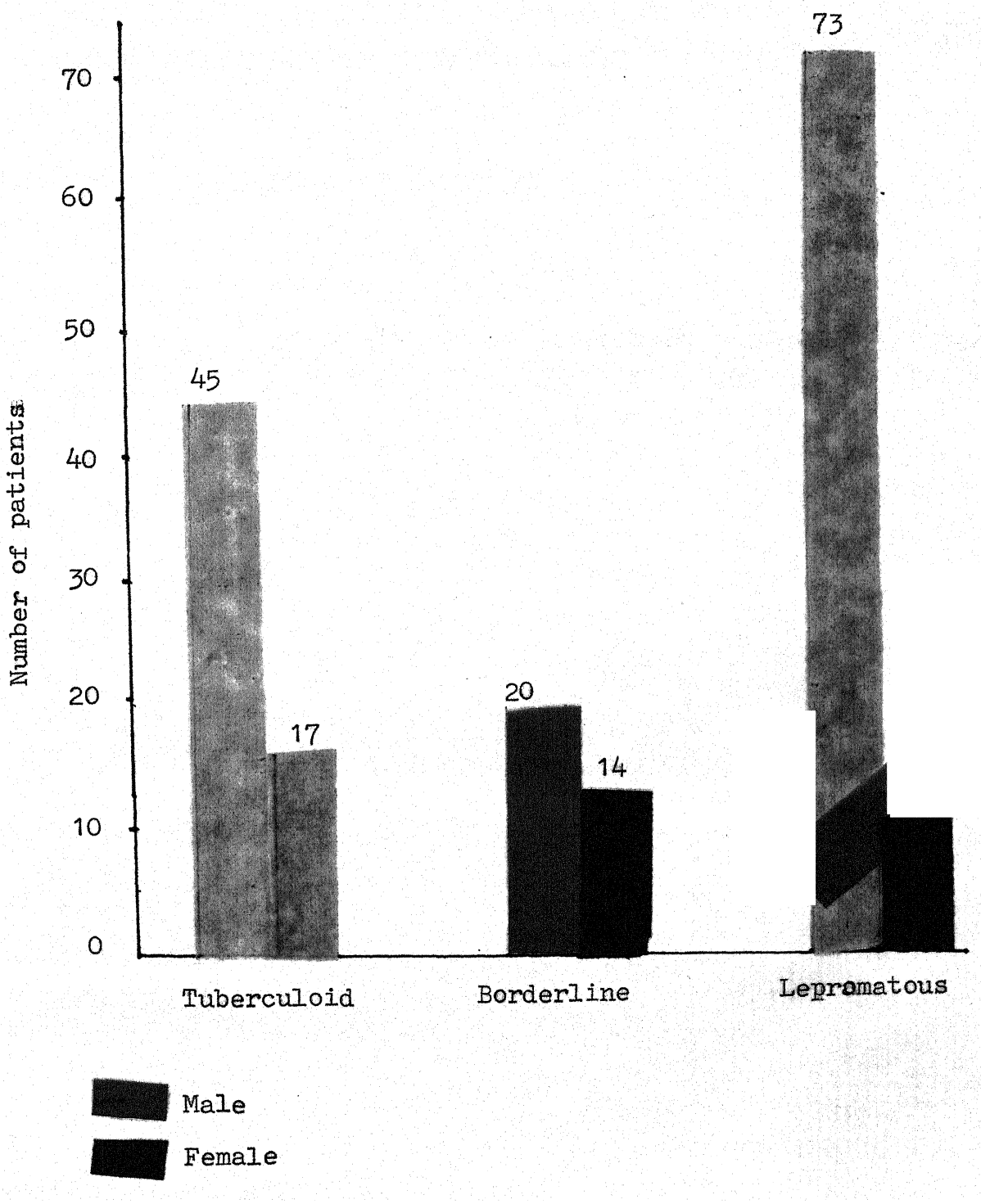


Table 4

PREVALENCE OF OCULAR LESIONS BY AGE AND TYPE OF LEPROSY

Age group	Total			Tuberculoid			Borderline			Lepromatous		
	No. of patients	Patients with ocular lesions		No. of patients	Patients with ocular lesions		No. of patients	Patients with ocular lesions		No. of patients	Patients with ocular lesions	
		No.	(%)		No.	(%)		No.	(%)		No.	(%)
0-10	3	-	-	-	-	-	2	-	-	1	-	-
10-20	15	3	(20.0%)	6	-	-	2	-	-	7	3	(42.8%)
20-30	41	13	(31.7%)	16	2	(12.5%)	8	2	(25.0%)	17	9	(52.9%)
30-40	40	23	(57.5%)	15	6	(40.0%)	9	4	(44.4%)	16	13	(81.3%)
40-50	35	26	(74.3%)	12	8	(66.6%)	6	5	(83.3%)	17	13	(76.5%)
50-60	34	27	(79.4%)	11	7	(62.6%)	6	4	(66.6%)	17	16	(94.1%)
60-70	11	9	(81.8%)	2	2	(100.0%)	1	1	(100.0%)	8	6	(75.0%)
70-80	1	1	(100.0%)	-	-	-	-	-	-	1	1	(100.0%)
	180	102	(56.7%)	62	25	(40.3%)	34	16	(47.06%)	84	61	(72.6%)

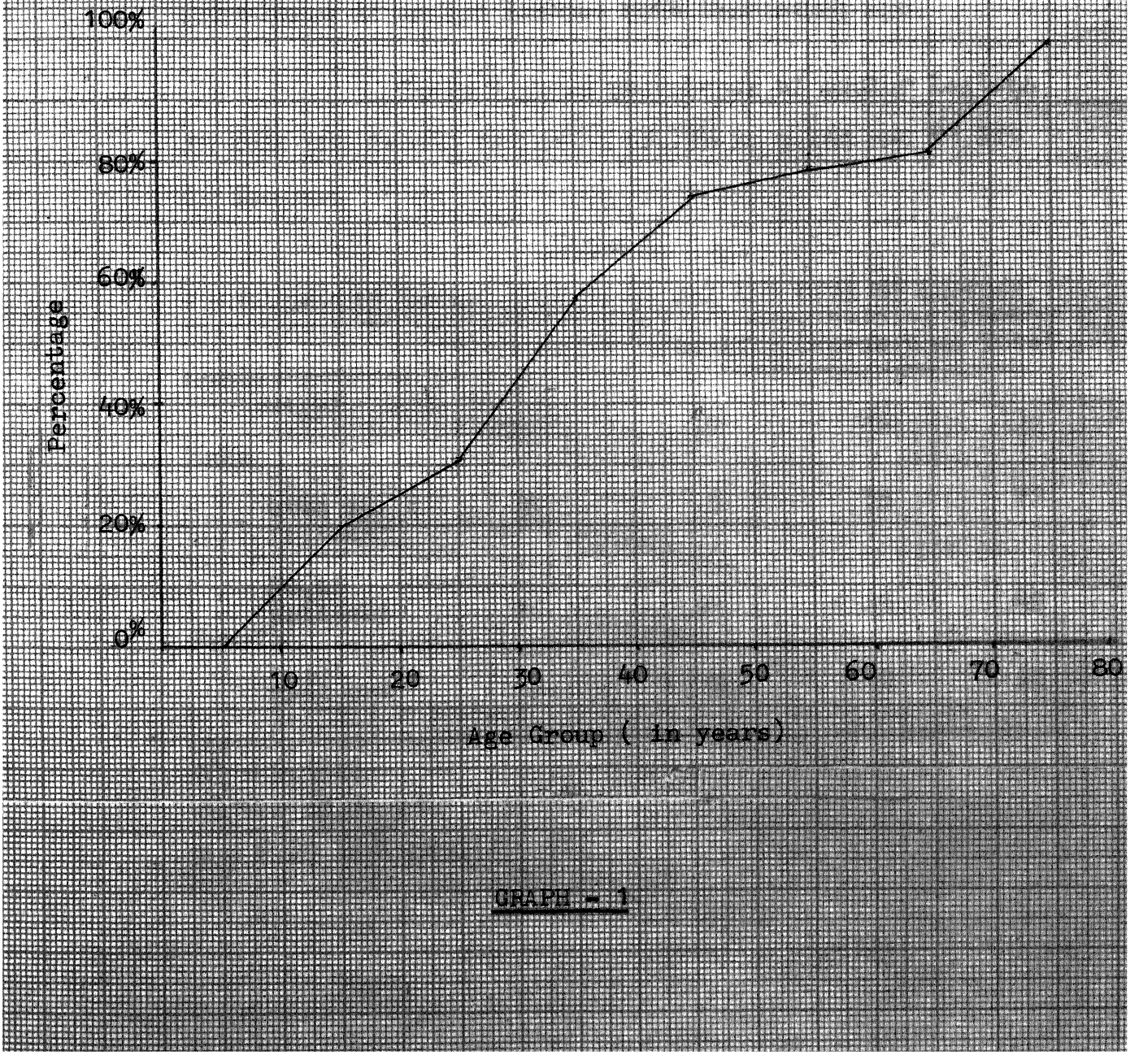
Prevalence of ocular lesions by duration of disease

$X^2 = 31.524$

degree of freedom = 3

$p < 0.001$ (Highly significant)

GRAPH SHOWING PREVALENCE OF OCULAR LESIONS BY AGE



GRAPH - 1

Table 4 shows prevalence of ocular lesions in different age groups of leprosy patients. Analysis of this table reveals higher percentage (75-100%) of ocular lesions in elderly patients above the age of 60 years in all types of leprosy. Graph 1 shows progressively increasing nature of curve, as drawn between prevalence of ocular lesions with increasing age.

Table 5 shows prevalence of ocular lesions in male and female patients: 55.79% in males and 59.52% in females.

Table 5

PREVALENCE OF OCULAR LESIONS BY SEX AND TYPE OF LEPROSY

		Tuberculoid	Borderline	Lepromatous	Total
Male	No.of patients	45	20	73	138
	No.of Pts. with eye lesions	16	8	53	77
Female	No.of patients	17	14	11	42
	No.of Pts. with eye lesions	9	8	8	25

X^2 = 0.1820

degree of freedom = 1

p > 0.50 (Not Significant)

Marital Status

Table 6 shows relationship of ocular involvement with marital status of leprosy patients. The prevalence was maximum in the widows / widowers/ separated (94.73%) followed by married persons (48.03%). Unmarried patients had the lowest prevalence (33.33%).

Table 6

PREVALENCE OF OCULAR LESIONS BY MARITAL STATUS

Marital status	No.of patients studied	No.of patients with eye lesions	Prevalence %
Un-married	15	5	33.33
Married	127	61	48.03
Widows/Widower/ separated	38	36	94.73

X^2 = 29.61
degree of freedom = 2
p / 0.001 (Highly significant)

Rural-Urban community

Table 7 shows ocular lesions in leprosy patients living in rural & urban areas. Out of 97 patients belonging to rural area a higher number i.e. 70 (72.16%) patients were unfortunate to have ocular lesions while out of 83 patients belonging to urban area only 32 (38.55%) were victims of ocular lesions.

Table 7

PREVALENCE OF OCULAR LESIONS BY RURAL URBAN COMMUNITY

Rural-Urban	No.of patients studied	No.of patients with eye lesions	Prevalence %
Rural	97	70	72.16
Urban	83	32	38.55

$X^2 = 20.57$

degree of freedom - 1

p /0.001/ Highly significant

Occupation

Table 8 shows prevalence of ocular lesions in leprosy patients engaged in various occupations.

Table 8

PREVALENCE OF OCULAR LESIONS BY OCCUPATION

Occupation	No.of patient studied	No.of patients with eye lesions	Prevalence %
Students	10	2	20.00
Businessman	12	3	25.00
Serviceman	18	5	27.77
Farmers	36	22	61.11
Labourers	35	24	68.57
Housewifes	32	18	56.25
Unemployed, retired or other	37	28	75.67

Prevalence rate was maximum among unemployed and retired persons (75.67%) followed by labourers (68.57%) and

farmers (61.11%). Students (20%), businessman (25%) and servicemen (27.77%) were having comparatively lower prevalence of ocular lesions.

Socioeconomic status

Table 9 shows that majority of the patients under study (165 cases) were in low socioeconomic status belonging to socioeconomic group IV and V. Only 15 cases were from socioeconomic group II and III and none from group I.

Table 9

PREVALENCE OF OCULAR LESIONS OF LEPROSY BY SOCIAL CLASS

Mean monthly per capita income	Social class	No. of patients studied	No. of patients with eye lesions	Prevalence %
Rs 600 & above	I	-	-	-
Rs 300 - 599	II	2	-	-
Rs 140 - 299	III	13	2	15.38
Rs 60 - 139	IV	62	18	29.03
Rs / 60	V	103	82	79.61

χ^2 = 48.44
degree of freedom =2
p / 0.001 (Highly significant)
Notes - Social classification- according to Shrivastava et al (1981).

Analysis of this table reveals involvement of eye in leprosy patients belonging to lower socio-economic groups - viz 82 (79.61%) and 18(29.03%) patients

Table 10

PREVALENCE OF OCULAR LESIONS BY DURATION OF DISEASE.

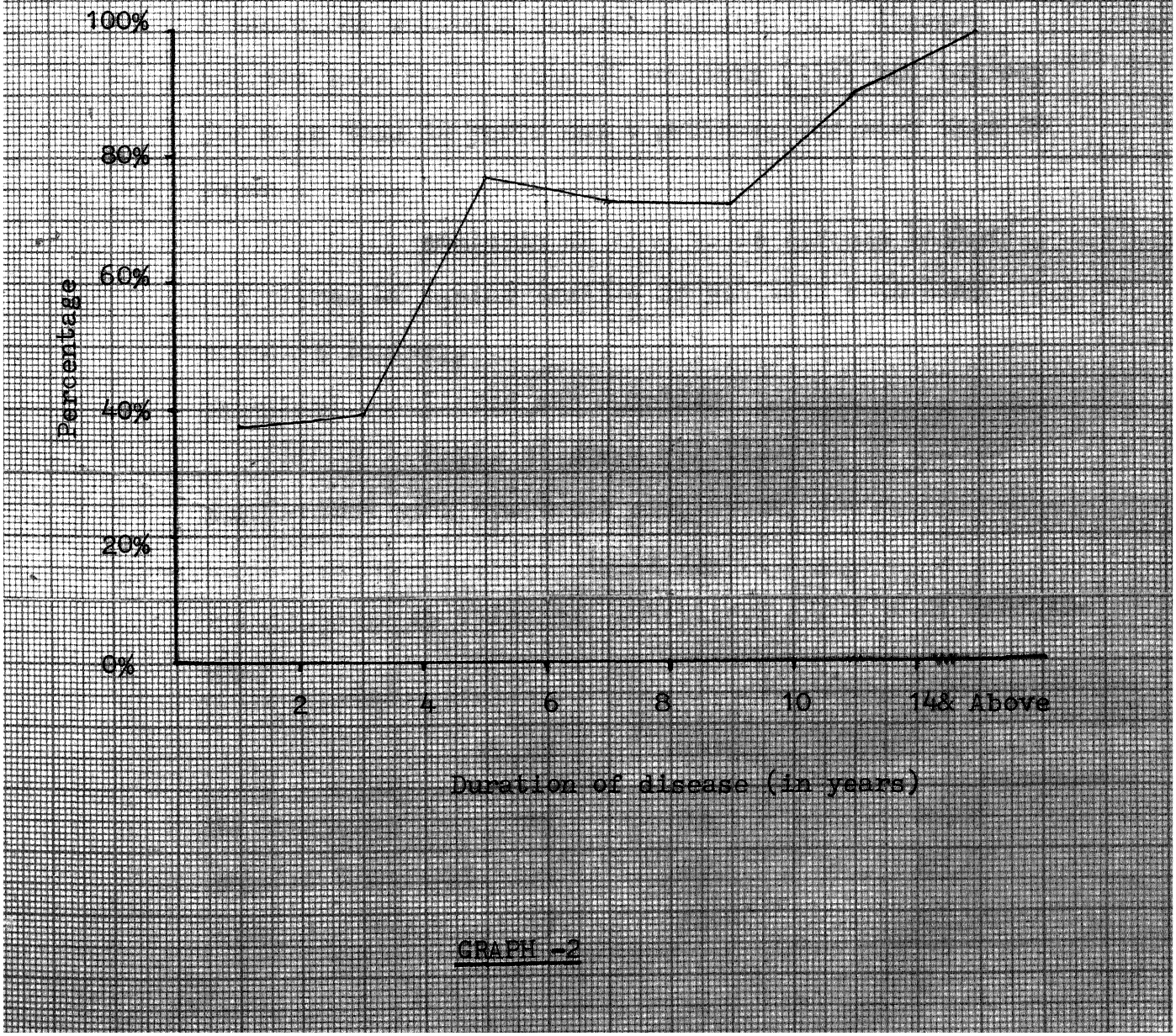
	Tuberculoid		Borderline		Lepromatous		Total		
	No.of patients	Patients with ocular lesions	No.of patients	Patients with ocular lesions	No.of patients	Patients with ocular lesions	No.of patients	Patients with ocular lesions	
								No	(%)
0 - 2	26	5	16	7	25	13	67	25	(37.3%)
2 - 4	13	2	7	3	18	10	38	15	(39.4%)
4 - 6	3	3	4	3	4	4	13	10	(76.9%)
6 - 8	5	3	3	1	11	10	19	14	(73.6%)
8 - 10	2	2	3	2	10	7	15	31	(73.5%)
10-14	3	2	-	-	7	7	10	9	(90.0%)
14-20	6	6	-	-	6	6	12	12	(100.0%)
7 20	2	2	1	1	3	3	6	6	(100.0%)
Total	62	25	34	16	84	61	180	102	(56.7%)

X^2 = 36.01

degree of freedom - 3

$p < 0.001$ (Highly significant)

GRAPH SHOWING PREVALENCE OF OCULAR LESIONS BY DURATION OF DISEASE



GRAPH -2

belonging to group V &IV respectively. Only 2(15.38%) patients of group III had eye manifestations.

Duration of disease

In this study duration of disease among leprosy patients varied greatly (0-40 yrs); however, mean duration of disease observed was 5.9 years. Majority of patients 67(37.2%) were having disease for less than 2 years. 85 patients (47.2%) suffered from disease between 2-10 years. Only 28 patients (15%) had leprosy for more than 10 years and 6 patients for more than 20 years (Table 10).

Analysis of this table reveals higher prevalence of ocular lesions in patients with long standing leprosy.

Treatment compliance and duration

Table 11 shows relationship of ocular involvement with treatment compliance.

Table 11

RELATIONSHIP OF TREATMENT COMPLIANCE AND OCULAR INVOLVEMENT

	Total No.of patients	Patients with ocular involvement Number	Percentage
No treatment	22	11	50.0
Regular treatment	91	27	29.67
Irregular treatment	67	64	95.52

Table 12

RELATIONSHIP OF REGULAR TREATMENT AND OCULAR INVOLVEMENT.

Duration of treatment	Duration of disease								
	∠ 2 yrs	2-4yrs	4-6yrs	6-8yrs	8-10yrs	10-14yrs	14-20yrs	-720yrs	Total
∠ 1 year	26(4)	11(3)	5(5)	4(4)	2(2)			2(2)	50(20)
1-2 years	11(1)	1	2(1)	2(2)	1(1)		2(2)		19(7)
2-4 years		10	1-	1	1				13
4-6 years			1	4					5
6-8 years					2				2
8-10 years					1	1			2
Total	37(5)	22(3)	9(6)	11(6)	7(3)	1	2(2)	2(2)	91(27)

Note:- Number of patients with ocular involvement are shown inside ( ).

Table 13

RELATIONSHIP OF IRREGULAR TREATMENT OR NO TREATMENT AND OCULAR INVOLVEMENT.

Duration of treatment	Duration of disease								
	∠ 2 yrs	2-4 yrs	4-6yrs	6-8yrs	8-10yrs	10-14yrs	14-20yrs	⌐20yrs	Total
No treatment	11(3)	7(4)	2(2)	1(1)	1(1)				22(11)
∠ 1 year	15(13)	4(4)	1(1)	3(3)	1(1)	1(1)			25(23)
1-2 years	4(4)	2(2)	1(1)	1(1)		2(2)			10(10)
2-4 years		3(2)		1(1)	1(1)	2(2)	3(3)		10(9)
4-6 years				2(2)	1(1)	1(1)		1(1)	5(5)
6-8 years					2(2)	2(2)	1(1)	1(1)	6(6)
8-10 years					2(2)		2(2)	1(1)	5(5)
⌐ 10 years						1(1)	4(4)	1(1)	6(6)
Total	30(20)	16(12)	4(4)	8(8)	8(8)	9(9)	10(10)	4(4)	89(75)

Note:- Number of patients with ocular involvement are shown inside ( ).

Out of total 180 patients only 158 patients were taking treatment, among these 91 patients were regular in their treatment while other 67 patients were irregular in their treatment. A higher prevalence of ocular involvement was seen among the patient taking irregular treatment (95.52%). While comparatively low prevalence of ocular involvement was observed among patients on regular treatment (29.67%). Only 50% ocular involvement was seen among patients taking no treatment at all.

Table 12 shows relationship of ocular involvement with duration of disease, duration of treatment among patients taking regular treatment. It is obvious from the table that no eye lesion observed among 22 patients taking regular treatment for more than 2 years. Eye lesions were common among those patient who were taking treatment for short period in contrast to longer duration of disease.

Table 13 reveals that all the patients, having disease for more than 4 years and taking no treatment or irregular treatment, were found to have eye lesions. Eye lesions were not present among the patient with recent onset of leprosy.

Leprosy Reactions

Only 12 patients were in the reactional states at the time of examination. Among these, 3 patients

were having tuberculoid leprosy, 4 patients were having borderline leprosy and 5 patients were having lepromatous leprosy. Out of total 12 patients seen in reactions, only 7 patients were found to have ocular lesions. (Table 14).

Table 14

LEPROSY REACTION AND OCULAR INVOLVEMENT

Type of leprosy reaction	Number of patients	Patients with ocular lesion No.(%)
Type I	8	4(50.0%)
Type II + (ENL)	4	3(75.0%)
Total	12	7(58.33%)

Ocular complaints

On direct questioning , about any problem of eye, a large number i.e. 35(19.44%) patients had complaint of diminution of vision.

Inspite of the presence of obvious and well established lesions in eyes of a large number of patients the other complaints recorded were pain (4.44%), redness (5.55%), watering (7.77%) irritation (4.44%) and foreign body sensation (1.11%).(Table 15).

Table 15

OCULAR COMPLAINTS AND TYPE OF LEPROSY

	Tuberculoid	Borderline	Lepromatous	Total	Percentage out of 180 patients
Diminished vision	6	8	21	35	(19.44%)
Pain	1	2	5	8	(4.44%)
Redness	-	2	8	10	(5.55%)
Watering	2	2	10	14	(7.77%)
Irritation	1	1	6	8	(4.44%)
F.B.Sensation	-	1	1	2	(1.11%)

Visual Acuity

Table 16 shows the visual acuity of patients with various types of leprosy.

Visual acuity in both the eyes was normal in 85 (47.22%) patients. Among these 5 were above the age of 50 years. In 22 (12.22%) patients visual acuity of only one eye was impaired varying from 6/9-3/60. 59(32.77%) patients were having diminished vision in both eyes. 6(3.33%) patients were found to be partially blind with visual acuity less than 3/60 in one eye and 8(4.44%) patients were completely blind with visual aduity less than 3/60 in both eyes. Further analysis of this table reveals that the impairment of vision was common among lepromatous leprosy patients 50(59.5%) followed by borderline leprosy patients 16(47.04%) and tuberculoid leprosy patients 29(46.69%).

Blindness, complete or partial was also common with lepromatous leprosy patients (8.33%) and borderline leprosy patients (11.76%) as compared with tuberculoid leprosy patients (4.83%).

Table 16

VISUAL ACUITY AND TYPE OF LEPROSY

	Tuberculoid	Borderline	Lepromatous	Total No.	Percentage out of 180 patients
Normal	33	18	34	85	(47.22%)
Impaired vision 6/9-3/60					
-Unilateral	5	2	15	22	(12.22%)
-Bilateral	21	10	28	59	(32.77%)
Blind /3/60					
-Unilateral	2	2	2	6	(3.33%)
-Bilateral	1	2	5	8	(4.44%)
	62	34	84		

Ocular Adnexa

It includes eyebrows, eyelids, eyelashes, orbicularis oculi muscle and lacrimal system along with intraorbital extraocular structures.

Table 17

LESIONS OF OCULAR ADENEXA AND TYPE OF LEPROSY

Type of lesions	Total Out of 180, Patients with lesions No(%)	Tuberculoid Out of 62, Patients with lesions No(%)	Borderline Out of 34, Patients with lesions No(%)	Lepromatous Out of 84, Patients with lesions No(%)
Eyebrows				
Complete loss	16(8.88%)	1(1.61%)	2(5.88%)	13(15.47%)
Partial loss	27(14.99%)	4(6.44%)	3(8.82%)	20(23.8%)
Thickening of supraciliary region	9(4.99%)	1(1.61%)	-	8(9.52%)
Nodule	5(2.77%)	-	-	5(59.5%)
Eyelashes				
Loss	20(11.11%)	2(3.22%)	2(5.88%)	16(19.04%)
Trichiasis	12(6.66%)	2(3.22%)	-	10(11.90%)
Lid				
Entropion	9(4.99%)	1(1.61%)	-	8(9.52%)
Ectopion	5(2.77%)	3(4.83%)	1(2.94%)	1(1.19%)
Thickening	11(6.11%)	1(1.61%)	3(8.82%)	7(8.33%)
Nodules	1(0.55%)	-	-	1(1.19%)
Lagophthalmos	5(2.77%)	3(4.83%)	2(5.88%)	-
Lacrimal system				
Chronic dacryocystitis	3(1.66%)	-	-	3(3.57%)

Table 17 shows high percentage of ocular adenexal involvement among leprosy patients 52(28.8%) patients. Loss of eyebrows complete and partial was most frequent with lepromatous p atients (39.27%) followed by borderline (14.7%) and tuberculoid (8.05%) Loss of eyebrow was found to be proportional to the duration of disease. Formation of nodules and thickening of the skin of supraciliary ridge was common with lepromatous leprosy (5.95%)and(9.52%) respectively. Only one case of thickening of supraciliary ridge was observed in tuberculoid leprosy.

Madaresis i.e. complete or partial loss of eye lashes was also most frequent with lepromatous (19.04%) followed by borderline (5.88%) and tuberculoid (3.22%) forms of disease.

Lagophthalmos, i.e. unability to close the palpebral aperture when an attempt is made, was observed only among tuberculoid (4.83%) and borderline cases of leprosy (5.88%). Out of total 5 cases of lagophthalmos 3 cases were unilateral and 2 cases were bilateral. Three cases were associated with ectropion of lower lid.

Incidence of entropion and thickening of upper lid was common with lepromatous type of leprosy (9.52%) and (8.33%) respectively. 4 cases

among these had signs of trachoma. In a case of lepromatous leprosy with reaction, a big nodule was present on the upper lid.

Syringing was done in 8 cases complaining of watering for long duration. Block at the nasolacrimal duct level was detected only in 3 cases.

Conjunctiva

Table 18 shows conjunctival lesions in various types of leprosy patients. High incidence of non leprotic lesions (43 cases, 23.66%) was observed. Non specific chronic catarrhal conjunctivitis was found common with lepromatous type of leprosy (10 cases, 11.9%). Only 3 cases (4.83%) of tuberculoid leprosy had chronic conjunctivitis. Acute conjunctivitis was seen only in 3 cases (1.66%) of leprosy.

Table 18

LESIONS OF CONJUNCTIVA AND TYPE OF LEPROSY

Type of conjunctival lesion	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, Patients with lesions No(%)	Out of 62, Patients with lesions No(%)	Out of 34, Patients with lesions No(%)	Out of 84, Patients with lesions No(%)
Acute Conjunctivitis	3(1.66%)	1(1.61%)	1(2.94%)	1(1.19%)
Chronic conjunctivitis	14(7.77%)	3(4.83%)	1(2.94%)	10(11.9%)
Pterygium	13(7.22%)	3(4.83%)	-	10(11.9%)
Pinguecula	8(5.44%)	2(3.22%)	1(2.94%)	5(5.95%)
Trachoma	13(7.22%)	4(64.4%)	2(5.88%)	7(8.19%)
Vit.A Deficiency	6(3.33%)	1(1.61%)	2(5.88%)	3(3.57%)

Other non specific conjunctival lesions like pterygium (7.22%), trachoma (7.72%),pinguecula (4.5%) and xerophthalmia (3.3%) were also found to be frequent in all the three types of leprosy cases.

Sclera

Involvement of sclera was not very common with leprosy. Only one case of lepromatous leprosy in reaction was observed with episcleritis. In two cases of lepromatous leprosy, having disease for more than 9 years, a white hard nodule was present at the limbus involving sclera as well as the cornea. In one case of lepromatous leprosy ciliary staphyloma was detected.

Cornea

Table 19 shows various corneal lesions in different types of leprosy. Superficial punctate keratitis was observed in 12 cases. The lesion was well established and visible to naked eye in 6 cases, all of whom had bilateral involvement of cornea. While in other 6 cases, it was observed, in a single eye as very faint subepithelial white punctate opacities when patients were examined on slit lamp.

In 5 cases (4 lepromatous and 1 borderline), deeper layers of cornea of one eye were found to be involved. In all these cases superficial punc-tate keratitis was present in the other eye also and in parts of the cornea of the same eye. Bilateral impairment of vision was seen in all these cases.

Table 19

LESIONS OF CORNEA AND TYPE OF LEPROSY

Type of corneal lesions	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, Patients with lesions No(%)	Out of 62, Patients with lesions No(%)	Out of 34, Patients with lesions No(%)	Out of 84, Patients with lesions No(%)
Superficial keratitis	12(6.66%)	2(3.22%)	2(5.88%)	8(9.52%)
Interstitial keratitis	5(2.77%)	-	1(1.94%)	4(4.76%)
Exposure keratitis	4(2.22%)	2(3.22%)	2(5.88%)	-
Ulcer	4(2.22%)	-	-	4(4.76%)
Pannus	7(3.88%)	2(3.22%)	2(5.88%)	3(3.57%)
Opacity	5(2.77%)	1(1.61%)	-	4(4.76%)
Impaired sensation	8(4.44%)	1(1.61%)	2(5.88%)	5(5.95%)

Exposure keratitis was seen in 4 cases of leprosy. In 3 cases it was associated with the lagophthalmos and ectropion of lower lid, while in one case exposure keratitis in lower pole of cornea of both eyes was due to partial closure of palpebral aperature during sleep.

Sensation of cornea were considerably impaired in 8 cases of leprosy. All except two patients had disease for more than 8 years and sensory impairment of cornea among these was associated with other lesions of cornea viz keratitis or corneal ulcer. In one case of tuberculoid and one case of borderline leprosy corneal sensations were diminished without any associated lesions of eye.

Unilateral ulcer was seen in 4 cases of lepromatous leprosy. In a case of corneal ulcer H/O trauma by some foreign body was present. In 3 cases corneal sensitivity was markedly diminished. Photophobia, blepharospasm and severe pain, the characteristic features of corneal ulcer were absent in these cases. Only slight watering, diminished vision, and irritation were noticed by these patients. Slight circumcorneal congestion was also present.

Pannus, superficial vascularization of cornea, was seen in 7 cases of leprosy. Nebulomacular opacity in 3 cases, leucomatous opacity in 1 case and adherent leucoma in one case was observed.

Anterior chamber

Anterior chamber was deep in 6 cases of leprosy patients who had been operated for cataract in past. In 3 patients anterior chamber was shallow. (Table 20).

Table 20

ANTERIOR CHAMBER AND TYPE OF LEPROSY

Character of Anterior chamber	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, Patients with lesions No(%)	Out of 62, Patients with lesions No(%)	Out of 34, Patients with lesions No(%)	Out of 84, Patients with lesions No(%)
Shallow	3(1.66%)	1(1.61%)	-	2(2.38%)
Deep	6(3.33%)	1(1.61%)	1(2.94%)	4(4.76%)
KPS	3(1.66%)	-	1(2.94%)	2(2.38%)
Flare	1(0.55%)	-	-	1(1.19%)

Keratic precipitates (K.Ps.) were seen on the posterior surface of cornea in total 3(1.66%) cases (2 cases of lepromatous leprosy and 1 case of borderline leprosy). Chronic iritis was detected in all these patients. Flare was seen in one case of lepromatous leprosy.

Iris

Iris lesions were detected in 18 cases of leprosy (15 lepromateus, 2 borderline and 1 tuberculoid leprosy) (Table 21). Most common iris lesion observed was chronic iritis (12 cases). 10 cases of lepromatous leprosy, 1 case of borderline leprosy and 1 case of tuberculoid leprosy were victim of this lesion.

Table 21

LESIONS OF IRIS AND TYPE OF LEPROSY

Type of iris lesions	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, patients with lesions No.(%)	Out of 62, patients with lesions No.(%)	Out of 34, patients with lesions No.(%)	Out of 84, patients with lesions No.(%)
Acute iritis	5(2.77%)	-	2(5.88%)	3(3.57%)
Chronic iritis	12(6.66%)	1(1.61%)	1(2.94%)	10(11.9%)
Iris Atrophy	2(1.11%)	-	-	2(2.38%)
Iris pearl	1(0.55%)	-	-	1(1.19%)
Iris naevus	1(0.55%)	-	1(2.94%)	-
Posterior synechia	5(2.77%)	-	1(2.94%)	4(4.76%)

Acute iritis was observed only in 5 cases of leprosy, 4 cases were in the reaction stage. Iris atrophy was seen in 2 cases of long standing lepromatous leprosy with chronic iritis. One white pedunculated mass projecting into the anterior chamber was detected in a case of lepromatous leprosy. Iris naevus was present in a case of borderline leprosy. The eye was otherwise normal in this patient.

5 cases of posterior synaechia were detected. One among these was belonging to borderline group and all others were belonging to lepromatous leprosy group.

Pupil

Table 22 shows pupillary lesions in different types of leprosy. Pupil was found constricted in 17(9.44%) cases of leprosy. 10 cases of lepromatous leprosy, 5 cases of borderline leprosy and only 2 cases of tuberculoid leprosy were detected with constricted pupil. In all these patients light reaction was either sluggisth or absent. In a case of lepromatous leprosy occlusio pupillae was present in one eye.

In 6 cases pupil was jet black and U shaped due to broad basal iridectomy performed along with lens extraction during cataract surgery.

In 3 cases of lepromatous leprosy, without any sign of iritis, pupil was almost normal in size but the reaction was found to be sluggish.

Table 22

PUPILLARY LESIONS AND TYPE OF LEPROSY

Type of pupillary lession	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, Patients with lesions No(%)	Out of 62, Patients with lesions No(%)	Out of 34, Patients with lesions No(%)	Out of 84, Patients with lesions No(%)
Constricted	17(9.44%)	2(3.22%)	5(14.7%)	10(11.9%)
Occlusio papillae	1(0.55%)	-	-	1(1.19%)
Broad Basal Iridectomy	6(3.33%)	1(1.61%)	1(2.94%)	4(4.76%)
Light reaction absent	2(1.11%)	-	-	2(2.38%)
Sluggish	18(1.00%)	2(3.22%)	5(14.7%)	11(13.09%)

Lens

Table 23 shows the prevalence of lenticular changes in leprosy patients. Evidence of unilateral or bilateral lenticular opacity was present in 35 (19.44%) cases. Among these patients 6 had cataract extraction.

6(3.33%) patients were having mature cataract in their one eye or both. Immature cataract was the most frequent lenticular lesion, seen in 22 (12.22%) cases.

Analysis of this table reveals that lenticular changes were most common with lepromatous leprosy (22 cases, 26.18%) followed by borderline 6 cases (17.64%) and tuberculoid

(7 cases, 11.27%).

Table 23

LENTICULAR CHANGES AND TYPE OF LEPROSY

Type of lenticular change	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, Patients with lesions No (%)	Out of 62, Patients with lesions No(%)	Out of 34, Patients with lesions No(%)	Out of 84 Patients with lesions No(%)
Early immautre cataract	12(6.66%)	1(1.61%)	3(8.82%)	8(9.52%)
Immature cataract	19(10.55%)	3(4.84%)	5(14.7%)	11(13.09%)
Mature cataract	6(3.33%)	2(3.22%)	1(2.94%)	3(3.57%)
Hypermature cataract	1(0.55%)	1(1.61%)	-	-
Aphakia	6(3.33%)	1(1.61%)	1(2.94%)	4(4.76%)
After cataract	1(0.55%)	1 (1.61%)	-	-
Total number of patients having evidence of lenticular changes	35(19.44%)	7(11.27%)	6(17.64%)	22(26.18%)

Table24 reveals that lenticular changes were more frequent above the age of 50 years as compared to that of under 50 yrs.

Table 24

PREVELANCE OF CATARACT IN DIFFERENT AGE GROUP OF LEPROSY PATIENTS.

	Total No.& percentage out of total patients in that age group	Tuberculoid No.& percentage out of total patients in that age group	Borderline No.& percentage out of total patients in that age group	Lepromatous No.& percentage out of total patients in that age group
30-40	1	1 (6.67%)	-	-
40-50	6(17.15%)	1 (8.33%)	1(16.67%)	4(23.53%)
50-60	18(52.94%)	3(27.27%)	4(66.67%)	11(64.70%)
60-70	9(81.81%)	2(100.0%)	1(100.0%)	6(75.0%)
70-80	1(100.0%)	-	-	1(100.0%)

Fundus

Specific fundus lesions of leprosy were not observed in any patient. However non specific fundus lesions were detected. Vitreous was hazy in 5 cases of leprosy. Black opacities were detected in 2 cases and floaters were present in 1 case. Colloid bodies were detected in 3 cases, chorioretinal scar in 1 case, opaque nerve fibres in 1 case and hard exudates in 2 cases. Macula was dull in 3 cases (Table 25).

Table 25

FUNDUS LESIONS AND TYPE OF LEPROSY

	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, patients with lesions No(%)	Out of 62, patients with lesions No.(%)	Out of 34, patients with lesions No.(%)	Out of 84, patients with lesions No.(%)
Specific fundus lesions	Nil	Nil	Nil	Nil
Non Specific fundus lesions				
Vitreous				
-Floaters	1(0.55%)	-	-	1(1.19%)
-Opacities	2(1.11%)	-	-	2(2.38%)
-Hazy	5(2.77%)	3(4.83%)	1(2.94%)	1(1.19%)
Fundus				
-Colloid bodies	3(1.66%)	1(1.61%)	-	2(2.38%)
-Chorioretinal scar	1(0.55%)	-	-	1(1.19%)
-Opaque nerve fibre	1(0.55%)	-	1(2.94%)	-
-Hard exudate	2(1.11%)	1(1.61%)	-	1(2.38%)
-Dull Macula	3(1.66%)	2(3.22%)	1(2.94%)	-

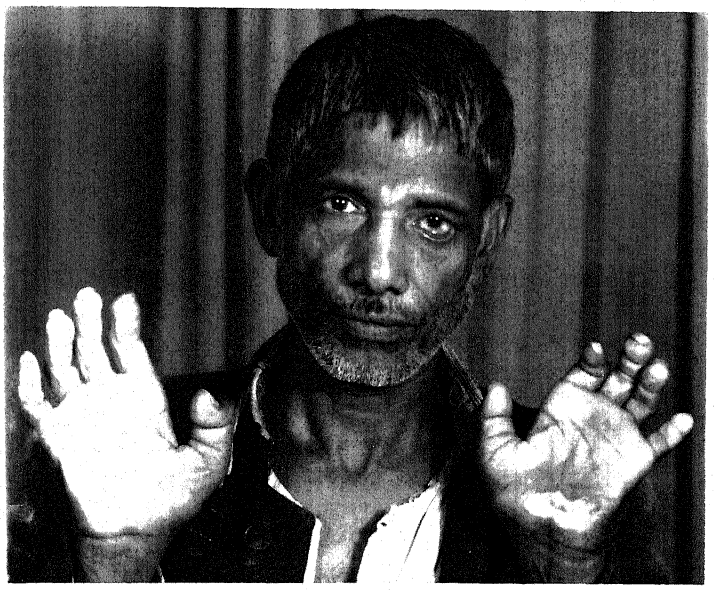
Tension

Intraocular tension was observed to be normal in both eyes in 157(87.22%) patients. In 15(8.33%) cases tension was found to be ⩽ 10 mm of Hg in one eye (2 tuberculoid 3 borderline and 10 lepromatous leprosy patients). It was not possible to record intraocular tension in 8(4.44%) cases, who were having exposure keratitis or corneal ulcer in their one or both eyes. Surprisingly not even a single case was found to have intraocular tension ⩾20 mm of Hg. (Table 26). 7 cases were detected to have tension difference more than 5 mm of Hg in between the two eyes.

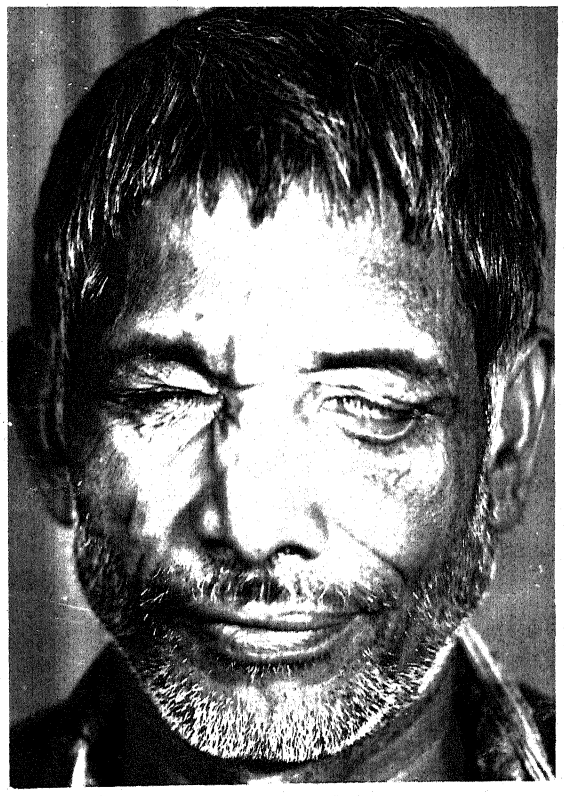
Table 26

INTRAOCULAR TENSION AND TYPE OF LEPROSY

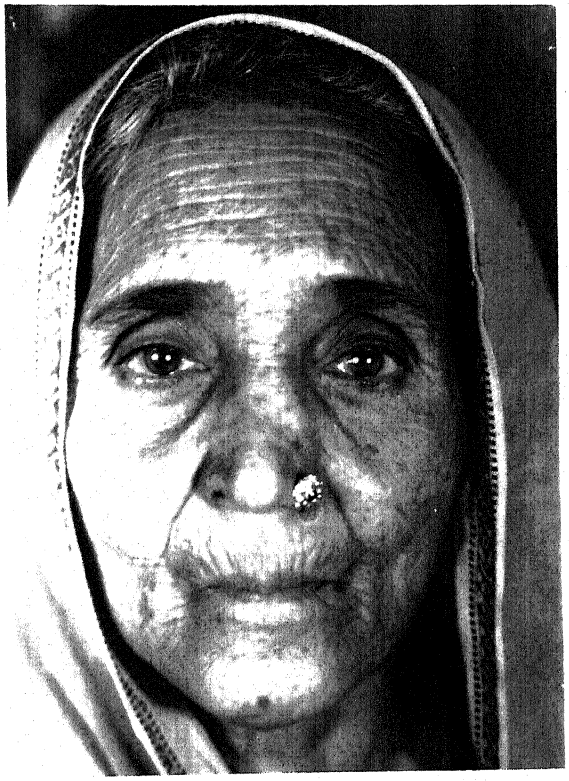
	Total	Tuberculoid	Borderline	Lepromatous
	Out of 180, patients affected No.(%)	Out of 62, patients affected No.(%)	Out of 34, patients affected No.(%)	Out of 84, patients affected No.(%)
Not recorded	8(4.44%)	2(3.22%)	2(5.88%)	4(4.76%)
⩽ 10 mm Hg	15(8.33%)	2(3.22%)	3(8.82%)	10(11.9%)
10-20 mm Hg	157(87.22%)	58(93.56%)	29(85.25%)	70(83.33%)
⩾20 mm Hg	Nil	Nil	Nil	Nil
Difference ⩾5 mm Hg in B.E.	7(3.88%)	1(1.61%)	2(5.88%)	4(4.76%)



PHOTOGRAPH OF A LEPROSY PATIENT HAVING UNILATERAL LAGOPHTHALMOS



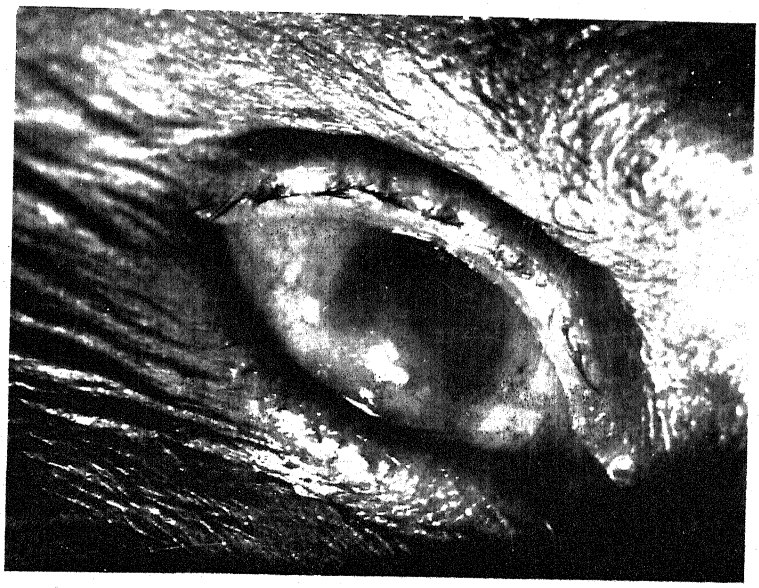
PHOTOGRAPH OF SAME CASE SHOWING INCOMPLETE CLOSURE OF LEFT EYE



PHOTOGRAPH OF A CASE OF LEPROMATOUS LEPROSY HAVING EYE INVOLVEMENT

PHOTOGRAPH OF THE EYE OF ABOVE CASE SHOWING SUPERFICIAL KERATITIS

PHOTOGRAPH OF A CASE OF LEPROMATOUS LEPROSY HAVING EYE INVOLVEMENT



PHOTOGRAPH OF THE EYE OF ABOVE CASE SHOWING ACUTE IRITIS

DISCUSSION

DISCUSSION

Leprosy, a disease of cosmopolitan distribution, takes a devastating course engulfing various parts of the body including the eye, resulting in blindness. It is a basic human right TO SEE; thus the eye, which somehow or other becomes the victim of the leprosy, is the cause of concern to humanity. Prevention of damage to eye by leprosy is essential.

In the present study, 84 patients had leprosy of lepromatous type, 34 borderline type and 62 tuberculoid type out of a total 180 patients. All the different types of disease, were found to be more common in males than the females (Table 3). Similar differences in prevalence of leprosy in both sexes were observed by Homes (1961) and Malla et al (1981). This sex difference is probably due to greater susceptibility rather than greater exposure in case of males as compared to females (WHO, 1966).

Out of total 102 patients, ocular findings were observed in 72.6% cases of lepromatous type, 47.00% of borderline type and 40.3% of tuberculoid type. Sehgal et al (1976) found ocular lesions in 43.4% of lepromatous and 18.7% of tuberculoid type. The difference in these

findings may be due to the fact that we included all the ocular features in the series, even those supposedly not due to leprosy. Weerakoon (1969) found eye involvement in 47% of leprosy patients in Ceylon, but he did not mention the type. Sheild (1974) quotes prevalence rates by several different workers varying between 6% and 90% depending upon the type of leprosy, mean age, average duration of disease in the series and criteria/equipments used for the diagnosis.

Average age of the patients included in this study was 41.56 years, with the range of 5-78 years. Most of the patients were in 3rd to 6th decades of their lives (Table 3). Prevalence of ocular lesions was found to increase, with advancing age of patients (Table 4). No ocular lesion was observed in the patients of $\angle$10 years while ~70% patients with eye involvement were found in the age group 40-50 years and above. This finding is statistically highly significant (X^2=31.52, df = 3 and p $\angle$0.001). In accordance with our findings, Emiru (1970) also did not report any ocular involvement in children and found that proportion of ocular involvement increased with age. Kirwan (1955) also stated that if the patient lived long enough and disease persisted some form of ocular involvement would eventually occur.

Though ratios of male and female population was 3.3:1 in this study, no significant sex-wise difference was observed in incidence of ocular lesions (X^2= 0.1820, df=1 and p >0.05). Similarly, Emiru (1970) did not notice any significant difference in ocular lesions between the two sexes.

A higher prevalence of ocular involvement was seen among widows, widowers and separated leprosy patients (94.73%) as compared to unmarried (33.33%) and married (48.03%) (Table 6). This difference was highly significant statistically (X^2= 29.61, df =2 and p<0.001). Factors responsible for this may be, higher age of these groups of patient in comparison to those not married, longer duration of disease alongwith reluctance to take treatment. Further, persons living alone are known to neglect their health needs.

Higher prevalence of ocular lesions in patients belonging to rural community (72.16%) as compared to the urban (38.55%) (Table 7) is statistically highly significant (X^2 = 20.57, df= 1 and p<0.001). Poor hygiene, lack of adequate and specialist medical facility and late initiation and then irregularity in treatment may be the responsible factors among rural patients.

Leprosy is thought to be prevalent commonly in lower socio-economic group (Park and Park, 1980). Majority of our patients belonged to low socio-economic groups i.e. IV and V. Ocular lesions were more frequent in these groups (29.03%) in class IV and (79.61%) in class V as compared to the others (15.38% in class III). Poor hygiene and nutritional status alongwith inappropriate medical care may be the responsible factors for this. It can not be established that occupation has direct impact on the prevalence of ocular complications due to close association of the occupation to the social class. Finding ocular lesions more in unemployed, retired and occasional workers may be due to disabilities and occasional workers may be due to disabilities and deformities depriving them of the employment. It is well known that a number of leprosy patients become beggars because of their being social outcasts.

Duration of disease - Duration of leprosy varied from 0-40 years with mean duration of 5.9 years. A higher incidence of ocular involvement was observed among the patients having disease for more than 4 years (~70%).

All patients having disease for more than 14 years were found to have ocular lesions (Table 10). Our findings are highly significant (χ^2= 36.01, df=3 and p $<$0.001) and are in accordance with Kirwan (1955)

who stated that longer the duration of disease the commoner were the ocular complications.

It was also observed that ocular complications tend to occur much earlier in course of lepromatous than borderline or tuberculoid types of leprosy. Variation may be due to difference in pathogenesis of ocular involvement in lepromatous and tuberculoid leprosy.

Treatment compliance

Considerably higher frequency of ocular lesions (95.52%) was observed in patients taking irregular treatment as compared to that in patients taking regular treatment (29.67%). Absence of any ocular lesion in patients taking regular treatment for more than two years established the significance of regular treatment in preventing the ocular complications. Further, effectiveness of regular treatment against ocular complications was found less in the patients with shorter duration of treatment and in comparison to longer duration of disease.

High frequency of ocular lesions in patients taking irregular treatment was probably due to ineffectiveness of irregular treatment against ocular complications, along with the negligence of these patients to their general health and ocular problems. A high number of nonleprotic lesions were also observed in these patients.

No specific study has been done to evaluate the role of systemic treatment in prevention of ocular lesions. Yet the views of various workers are in accordance with our findings (Cheyee 1964; Ebenezer 1963 and Holmes, 1957). Emiru (1970) reported " Modern treatment seems to reduce the incidence of ocular complications and blindness in leprosy ".

Leprosy Reaction - Seven patients were found to have ocular lesions among 12 patients of leprosy seen in reaction stage (Table 14). Acute painful, congestive form of iritis was seen in four cases of leprosy. Among these, three cases (75%) were seen with erythema nodosum leprosum. Similarly a higher prevalence of ocular involvement especially acute iridocyclitis was expected in leprosy reaction by Weerekoon (1969) and other workers.

Ocular complaints - Only a few patients complained of ocular problems despite the large number of patients with some eye lesions. Especially few serious eye lesions expected to be much harassing in normal persons were found to be symptomless. However, most common complaint was the diminution of vision in 35 (19.44%) symptomatic patients (Table 15). Pain, redness, watering, irritation and f.b. sensation were infrequent. Similarly, Shafid (1974) did not reported any complaint in a number of patients

despite obvious irritation of eyelids, conjunctiva and cornea. It may be due to decreased corneal and conjunctival sensitivity. I personally feel that mildness of early ocular symptoms in comparison to the other non-ocular disfiguring lesions in the body of leprosy patients, is responsible factor for comparatively few ocular complaints.

Visual Acuity - Visual acuity was found to be normal in 85 (47.22%) patients and impaired (between 6/9 - 3/60) in 81 (44.99%) patients (Table 16). There was considerably high number of partially or completely blind patients, i.e. 14(7.77%). Visual acuity was 3/60 in one or both of their eyes. Among these,6(3.33%) patients were partially and 8(4.44%) were completely blind. Srivastava et al (1978) reported the prevalence of blindness in general population in this region to be 1.73%. Thus the prevalence of blindness in leprosy patients of Bundelkhand region (7.77%) is considerably high.

The causes of blindness in leprosy patients were about in 50% due to leprotic lesions[(42.84%) iritis and 7.14% keratitis]and 35.70% due to cataract and remaining due to other causes. The prevalence of blindness was more in cases of lepromatous type (8.33%) and borderline type (11.77%) in comparison to tuberculoid type (4.84%).

This can be explained by the fact that there is early and more ocular involvement in lepromatous and borderline leprosy.

Iritis was found to be the most common blinding lesion (42.84%) in this study. This has also been reported as the most common cause of blindness in leprosy patients by many workers (Fiytche, 1981). However, exposure keratitis described as the second most common cause of blindness was not observed in this study. This is due to the fact that all 4 cases of exposure keratitis seen in our study were in early stage and they were taking treatment for their ocular problems. Thus, if exposure keratitis is managed properly the blindness caused by it can be delayed or prevented.

Prevalence of blindness in this study (7.77%) may be compared with the other studies on leprosy patients. Weerakoon (1969) reported prevalence of blindness to be 13.6% among leprosy patients of Ceylon. Reddy et al (1981) observed [illegible] blindness in 8% cases. Malla et al (1981) reported blindness among 13.9% cases of tuberculoid and 26.1% cases of lepromatous leprosy in Nepal.

A low prevalence of blindness (1.34%) was observed in Uganda (Emiru, 1970) and a little higher (5.8%) in Northern Ghana (Chatterjee and Chaudhary, 1964).

The difference may be due to variation in the age, mean duration of disease and type of leprosy patients included in the study.

Ocular Adenexa - Involvement of ocular adenexa was found in 52 (28.8%) leprosy patients. This high frequency of involvement of ocular adenexa is because of structural similarity of lid, eyebrows and eyelashes to the skin. Lesions extend directly from the skin to these tissues. Moreover, being one of the most exposed part of body, these are the preferential sites for lodging of M. lepras. Emiru (1970) has reported adenexal lesions in 14.8% cases and Sehgal et al (1976) reported it in 17% cases.

Complete or partial loss of eyebrows was observed in 43 (23.77%) cases. It was found to be the most frequent in lepromatous patients (39.27%) followed by borderline (14.7%) and tuberculoid patients (8.05%) (Table 17). This is due to the infiltration of hair follicles in the lepromatous leprosy. Similarly, high frequency of loss of eyebrows in lepromatous leprosy, was observed by Malla et al (1981). Sehgal et al (1976) found only 5.7% cases of loss of eyebrows, probably due to lesser number of lepromatous cases in their series. Loss of eyelashes was observed in 20(11.11%) cases. It

was more frequent in lepromatous (19.04%) than in tuberculoid (3.22%) or borderline (5.88%) leprosy. These results are similar to Wasfy (1971) series and Malla et al (1981) series.

Entropion was observed in 9(4.99%) cases, mostly in lepromatous 8(9.52%) patients. Sheild (1974) and Harrel (1977) observed this lesion in 13% and 20% cases respectively. Higher average age of patients and longer average duration of disease in their series may be the contributory factors for difference in results. Trichiasis, was observed in 12(6.66%) cases. The results are almost similar to the other series (Chaudhary and Chatterjee, 1964; Mala et al, 1981). Skin of supraciliary region was found to be thickened in 9(4.99%) cases, more so in lepromatous (9.52%) than in tuberculoid types (1.61%). Sheild (1974) reported 29% cases with this lesion. This difference in results are because of difference in the mean age of patients and average duration of disease.

Lagophthalmos was found in 5(2.77%) cases. It was bilateral in 2 cases and unilateral in 3 cases. Frequency of lagophthalmos was more in tuberculoid 3(4.83%) cases and borderline 2(5.88%) cases. Almost same findings were observed by McLaren (1961) and Chatterjee and Chaudhary (1964). Harrel (1971) observed 9 cases of lagophthalmos among 48 leprosy patients in Canal-Zone.

In his series high average age of patients (66 years) and long average duration of hospitalization (35 years) seems to be the contributory factor for higher incidence.

Involvement of lacrimal sac was not much frequent. Only 3 (1.66%) cases were detected with chronic dacryocystitis, inspite of depressed nose bridge in much more patients. All these 3 cases were in advance stage of lepromatous leprosy with depressed nose bridge. Weerakoon (1969) reported 2.2% cases and Harrel (1974) reported 2.0% cases of lacrimal sac involvement in leprosy patients.

Conjunctiva, Episclera and Sclera - The most common conjunctival lesion detected in present study was the chronic conjunctivitis. It was detected in 14(7.77%) cases followed by non-specific pterygium in13(7.22%) cases, trachoma in 13(7.22%) cases, pinguecula in 8(4.44%) cases and vit.A deficiency in 6(3.33%) cases. Acute conjunctivitis with mucopurulent discharge was present in 3 (1.66%) cases. High frequency of chronic conjunctivitis was observed in patients with lepromatous leprosy i.e. 10(11.9%) cases, followed by tuberculoid leprosy 3 (4.83%) cases and borderline leprosy 1(2.94%) case. Our findings are similar to the findings reported by Malla et al (1981). He reported chronic conjunctivitis in 9.8% of lepromatous leprosy cases and 3.8% in tuberculoid cases. A high

percentage of non-specific conjunctivitis (17.6%) was reported in leprosy patients of Northern Ghana by Chatterjee and Chaudhary (1964).

Higher incidence of pterygium, pinguecula, trachoma and vit.A deficiency observed in leprosy patients may be due to regional climatic conditions. Further, poor hygiene, poor health and low socio-economic status of leprosy patients may be the contributory factors in their occurance.

Scleral lesions were not found to be frequent, yet they were specific and significant. White hard nodule at limbus in two lepromatous leprosy cases were similar to that reported by Emiru (1970). Scleritis and episcleritis reported to be 11% and 5% by Weerakoon (1969)& Sheild (1964) respectively were not frequent (0.5%) in our series.

Cornea - Lesions of cornea in leprosy were very specific, characteristic and pathognomonic. The most common and ### characterstic feature of ocular manifestations in leprosy was superficial keratitis in 12(6.66%) cases followed by interstitial keratitis in 5(2.77%) cases exposure keratitis in 4(2.22%) cases, leprotic pannus in 7(3.88%) cases, corneal opacity in 5(2.77%) cases, corneal ulcer in 4(2.22%) cases and impaired sensation in 8(4.44%) cases (Table 19).

Superficial keratitis, peculiary without any complaint from patient,was found more commonly in lepromatous leprosy i.e. 8(9.52%) cases than in borderline 2(5.88%) cases or in tuberculoid leprosy 2(3.22%) cases. Almost similar findings had been reported by Dethlefs (1981). Sheild (1974) had reported a higher percentage of this lesion (19%). This difference is probably due to high average age and long average duration of disease in his series.

Interstitial keratitis was seen mostly in 4 cases (4.76%) of lepromatous leprosy, followed by borderline leprosy 1 case (3.22%). Comparatively lower frequency of interstitial keratitis (0.4%) had been reported by Chatterjee and Chaudhary (1964). In contrast to it a frequency of 6% had been reported by Sheild (1974).

Exposure keratitis was not seen in such violent form in our series as reported by others. A possible explanation may be that in all these cases duration of lagophthalmos was not ~~7~~2 years and patients were taking regular treatment. Among 4 cases (2.22%) of exposure keratitis in our study one was due to incomplete closure of eye during sleep. This patient showed otherwise normal orbicularis oculi. Harley (1977) observed 13%

cases of leprosy with exposure keratitis. In his series average age of patient and average duration of disease were higher than in ours.

Corneal ulcer was observed in 4 cases (2.22%) of lepromatous leprosy. In one case it was due to trauma and in the three others due to impaired corneal sensation. There was mild to moderate pain and slight ciliary congestion in all these cases.

Pannus, the superficial vascularization of cornea, was found in 7(3.88%) cases. In 5 (2.77%) cases, it was typical of trachomatous pannus, however, in 2(1.11%) cases it was typical leprotic pannus. Sehgal et al (1976) reported incidence of leprotic pannus in 1.16% cases of leprosy. Dethlefs (1981) found no leprotic pannus in 110 leprosy patients in New Guinea. Harrel (1977) reported a very high frequency of leprotic pannus (43%) among leprosy patients of Canal-Zone. Explanation of this discrepancy may be the regional and racial variations along with difference in the average age of patients and average duration of illness.

Though, opacity of cornea is not specific of leprosy, yet it has been reported in leprosy patients by various workers. In 3 (1.66%) cases in our study, it was nebulomacular opacity due to trichiasis and trachoma. In one case leucomatous opacity was present as a sequelae of corneal ulcer and in another case adherent leucoma was seen as a sequelae of perforation of corneal ulcer.

Sensations of cornea were found markedly impaired in 8(4.44%) leprosy patients. Similarly loss of sensation was observed in 7% leprosy patients in Nepal and New Guinea by Malla et al (1981) and Dethlefs (1981) respectively. Ticho and BenSira (1970) reported loss of sensation in only3% leprosy patients of Malawi. Few workers have reported a very high frequency of loss of sensation e.g. 36% by Saxena and Dwivedi (1971), 67% by Harrel (1977) and 70% by Reddy et al (1981).

Thickening of corneal nerves and bead like formation on corneal nerves were not observed in this study. Hibi (1956) did not reported significant thickening of corneal nerves in lepromatous or neural type of leprosy. Somerset (1962) also clearly mentioned nodular thickening of corneal nerves in leprosy patients as very unusual.

Iris- Itis lesions in leprosy patients especially chronic iritis, iris atrophy and iris pearl are very characteristic and pathognomonic. In this study, 18(10%) cases with iris involvement were detected. Similarly, Hobbs (1972) observed 8% leprosy patients with iris involvement. However few workers reported very high percentage of iris lesions. (19% by Sheild, 1974; 59% by Harrel, 1977). This higher involvement of iris was explained by some factors in their study. They included mostly lepromatous leprosy patients

with higher average age and longer average duration of disease. Chatterjee and Chaudhary (1964) observed iris involvement in only 3.8% cases, as in their study the number of non lepromatous patients was much higher than lepromatous.

Chronic iritis, most common and slowly growing disastrous lesion was observed in 12 (6.66%) cases. Most of them belonged to lepromatous groups 10(11.9%). Similarly, Chatterjee and Chaudhary (1964) observed chronic iritis in 8.75% cases of lepromatous leprosy. Dethiefs (1981) and Malla et al (1981) also reported higher incidence of chronic iritis in lepromatous leprosy patients. The visual acuity was found considerably impaired in these cases.

Acute iritis was observed in 5(2.77%) cases. Among these 4 cases were in the reactional states. One case of borderline leprosy with acute iritis was not showing any sign of reaction. Acute inflammatory symptoms were seen in all these cases with considerable visual impairment. Almost similar to our findings Sheild (1974) and Reddy et al (1981) had reported 2% incidence of acute iritis among leprosy patients.

Iris atrophy was observed in 2(1.11%) cases of leprosy. It was seen as a marked patchy degeneration of iris stroma and loss of pigmentary epithelium. However,

hole in the iris was not seen in any of leprosy patient as reported by Siam (1971).

Iris pearl, a very characterstic and pathognomonic though not a frequent sign of leprosy, was seen in only 1(0.55%) patient in this study. Other workers also reported almost same figures; 2%, Ffytche (1981) and 3%, Dethlefs (1981). Large number of workers were unable to find out iris pearl in any case. Weerakoon (1969) and Emiru (1970) both were able to find out one case of iris pearl among 630 and 890 patients examined respectively.

Iris naevus, though not characterstic of leprosy, was present in a case of borderline leprosy. The eye was otherwise normal suggesting it to be non-pathological. However, detailed histological study of this lesions is essential to reach any conclusion. Posterior synechia was observed in 5 cases as a sequelae to the long standing chronic iritis.

Pupillary lesions - Pupil was constricted in 17(9.44%) leprosy patients. Cause of constricted pupil was either chronic or acute iritis. Light reaction was found absent in 2(1.11%) cases and sluggish in 18(10%) cases (Table 22). Our findings were in accordance with those of Shaild(1974).

He observed irregular pupil in 10% cases and sluggish reaction in 18% cases. Peripheral, post ganglionic autonomic denervation has been reported to be the contributory factor for this ocular manifestation (Fitzche,1981) This view is supported by the findings of pharmacological study by Swift and Rauschard (1972).

Lenticular changes - Cataract is the commonest cause of blindness in India. Lenticular changes were detected in 35 (19.44%) cases. Most common lenticular changes observed were immature and mature cataract (Table 23). Our findings are in accordance with other workers 12% Weerakoon (1969) - 15% Saxena and Dwivedi (1971); 29% Sheild (1974) and 23.9% Malla et al (1981). Though there is no direct invasionof lens by leprosy bacilli, the lenticular changes observed in leprosy patients may be secondary to iritis (Sommerset, 1962) or due to senile process.

The lenticular changes were common with lepromatous leprosy (26.18%) than tuberculoid (11.27%) or borderline leprosy (17.64%). The difference may be due to high frequency of chronic iritis in lepromatous leprosy patients leading to secondary cataract or due to biochemical changes caused by M. Leprae present in the iris of the lepromatous patients (Prabhakaran, 1971).

Almost all the cases of lenticular changes were detected in the age group -7 40 years except for a case of traumatic cataract aged 32 years. Incidence of lenticular changes found to increase with the age of leprosy patients i.e. 23.53% in 5th decade, 64.70% in 6th decade, 75% in 7th decade and 100% in 8th decade of life (Table 24). However, Sorsby (1964) clearly mentioned that presence of lenticular changes above the age of 40 years was most commonly due to senile ageing process and gradual increase in percentage of cases were found in successive decades.

It was observed that there was higher percentage of lenticular opacity in lepromatous leprosy cases than in the other two groups. Thus, though it will be premature to conclude that leprosy leads to the cataract formation yet the process is accelerated in leprosy. It is mainly because of associated iritis and partly because of biochemical or other unknown cause. This subject requires more detailed study.

Fundus lesions - No specific fundus lesion of leprosy was observed. Similarly, Tiche and BenSira (1970), and Malla et al (1981) were unable to find any specific fundus lesion among leprosy patients. Most probable explanation is that we were not able to examine the

fundus of well advanced cases of ocular lesions among lepromatous leprosy patients because of constricted pupil and opacity in media. Elliot (1949), Somerset (1956) and Choyce (1969) all agree with the point that fundus lesions behind the equator of eyeball are less common. However, non-specific eye lesions were detected. The number of the findings in the posterior segement were too small to form the basis of any conclusion especially as there has never been any survey of the fundi of the normal population. Hard exudates observed in the macular and paramacular area of two cases and chorio-retinal scar observed in a case may be of some significance.

Intra Ocular Tension - Intra ocular tension (IOT) was normal in most of cases (87.22%). I.O.T. was $\leq$ 10 mm Hg in 15 (8.33%) cases. It was not found to be $\geq$ 20 mm Hg in any case of leprosy. Very few reports were available in literature on IOT in leprosy patients. Reports by some workers suggested primary glaucoma as a rare finding in leprosy patients (Prendergast, 1940; Sheild 1974; Brandt et al, 1981). They established the fact that obliterating changes in the ciliary body itself counteract the primary glaucomatous changes in the trabecular meshwork through diminished production of aqueous. This may be responsible for the reduced IOT found in our cases.

Secondary glaucoma were also not found to be frequent by Brandt et al (1981). He suggested that in leprotic chronic iridocyclitis, excretion of protein leads to an increased viscosity of aqueous humour and proteins acts as an additional barrier in the trabecular mesh work. So aqueous reducing component outweight the diminished filtration of aqueous resulting in secondary glaucoma as a rare finding.

SUMMARY AND CONCLUSION

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Leprosy, a chronic infectious disease, cosmopolitan in distribution known for the ages, affects most of the parts of the body including the eyes leading to blindness. Depending upon the immunity of host it can manifests in lepromatous, tuberculoid or borderline form. Ocular lesions in leprosy may result indirectly from the paralysis of V and VII cranial nerves or directly by the invasion by M. leprae. Hypersensitivity reactions or secondary infection also damage the eye.

All the changes that affects the body in leprosy can affect the eye and its adenexa, so the ocular manifestations have no mystery of their own. The disease shows same relentless chronicity in the eye, as in the other parts of body.

Estimated number of leprosy patients in the world are more than 12 million , among these 5.0- 7.5 lacs have blindness. Despite major advances in recent years in the understanding of the pathology and treatment of leprosy, ocular complications still pose the greatest single threat to the patients.

Present study was undertaken to asses the prevalence of ocular lesions in leprosy patients of Bundelkhand region, its relationship with the duration and type of the disease and to find out preventive value of regular and controlled treatment of leprosy with the eye involvement.

A series of 180 patients of all ages (mean age 41.56 years) and both sexes (male 138; female 42) attending the leprosy clinic of M.L.B. Medical College Hospital, were included in this study. Patients were diagnosed by dermato venereologist and the type was confirmed by histopathological examination. They were broadly grouped into lepromatous tuberculoid and borderline leprosy.

Details of the information of each patient was recroded on a pre set proforma followed by external examination and necessary investigations. Slitlamp examination, funduscopy and tonometry of each case was done.

Out of total 180 patients, 84 belongs to lepromatous type, 34 to the borderline type and 62 to the tuberculoid type. Eye lesions were detected in 102 (56.7%) cases, most of them i.e. 72(40.0%) were having typical leprotic eye lesions. Eye lesions were more common in

lepromatous leprosy (72.6%) followed by borderline (47.0%) and tuberculoid (40.3%).

Prevalence of ocular lesions was found more in the patients of advanced age group (about 80% in patients $\geq$50 years), residing in the rural community (72.14%), belonging to the low social-economic group (79.61%), suffering from disease for long duration (100% in patients with $\geq$14 years duration) and not taking regular treatment.

The part observed to be most commonly affected was ocular adenexa, followed by conjunctiva and cornea. No specific fundus lesions was found in any case. Vision was greatly affected, mostly in lepromatous type of leprosy.

In the light of the present work and with a view of studies done in the past, the following can be concluded.

1. Leprosy affects the persons of almost all age group, but manifests most commonly in 3rd to 6th decade.
2. Prevalence of ocular lesions is 56.7% among leprosy patients, in Bundelkhand region. However , it is only 40% due to specific leprosy lesions.
3. Ocular involvement is most, common, in lepromatous leprosy (72.60%) followed by Borderline (47.00%) & least in tuberculoid time (40.30%).

4. Ocular involvement is most common in the leprosy patients of higher age group, belonging to rural community and low socio-economic group.

5. Longer the duration of disease, more frequent is ocular involvement.

6. Early initiation and regularity of systemic treatment have definite role in prevention of ocular complications of leprosy patients.

7. Most frequently an early eye lesion, is the adenexal involvement in the form of, complete or partial loss of eyebrows, eyelashes, trichiasis and thickening of lids and supraciliary skin.

8. Lagophthalmos, Mostly seen in tuberculoid type and borderline type, is mainly responsible for the exposure keratitis and its complications. These complications may be prevented by early institution of local treatment.

9. Though chronic conjunctivitis is frequent, it is not specific for leprosy. On the contrary, scleral nodules are in-frequent, yet are characteristic feature of leprosy.

10. Corneal involvement, particularly superficial keratitis, interstitial keratitis and leprotic pannus are very characteristic features of leprosy, occuring mostly in lepromatous type of leprosy. Superficial punctate

keratitis starts from the limbus and enchroaches towards the centre of cornea, without any symptom in early stage. Interstitial keratitis though not much frequent, is one among the serious complications of leprosy, leading to blindness.

11. Chronic iritis the most common cause of blindness in leprosy mostly occurs in lepromatous type of leprosy. This disastrous lesion produces no symptoms in early stages and can not be diagnosed by slitlamp examination. Iris pearl though not frequent, is the most pathognomonic specific feature of this disease, it is seen as a whitish nodule, projecting on the surface of iris.

12. Acute iritis is not specific and mostly occurs in reactional states of the disease.

13. Though lenticular changes are more in lepromatous type of leprosy patients yet it will be premature to conclude that leprosy leads to cataract formation. The process is accelerated in leprosy greatly because of associated iritis and partially because of biochemical and other unknown causes. The subject requires more detailed study.

14. Leprosy somehow or other, produces changes in the structures related to aqueous formation and filtration, leads to low intraocular tension. This also needs special attention for study.

Thus, ocular manifestations are common in leprosy patients. Their early diagnosis is essential to prevent irreparable damage to the eye.

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APPENDIX

APPENDIX - 1

OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND REGION

PROFORMA FOR EXAMINATION

CASE NO	DETAIL OF PATIENT
1. Name of Investigater	1. Name
2. Surgeon I/C	2. Age/Sex
3. Place	3. Registration No. (In leprosy unit)
4. Date	4. Address
	5. Occupation
	6. Socioeconomic status
	7. Married/Unmarried
	8. Rural/Urbam

CHIEF PRESENTING FEATURES OF DISEASE

1. Hypopigmented patches:
2. Impaired Sensation:
3. Nerve Thickening:
4. Nodules:
5. Non healing ulcers:
6. Deformity of hands:
7. Deformity of feet:
8. Deformity of face:
9. Others:

PERSONNEL HISTORY: Addicted to alcohal
Tobacco
Other intoxicants

FAMILY HISTORY OF LEPROSY: Mother - Father - Son - Daughter
Brother - Sister - Wife -Husband

DURATION OF DISEASE :

DURATION OF TREATMENT:

Regular/Irregular -

Drugs used -

ANY DRUG REACTION - YES/ NO

TYPE OF LEPROSY:

REACTION STATE :

HISTORY OF ANY OTHER CHRONIC SYSTEMIC DISEASE

OCULAR COMPLAINTS

1. Diminished vision Duration

Onset - Sudden/Gradual

2. Pain
3. Redness
4. Watering
5. Irritation
6. F.B. Sensation
7. Others

ANY HISTORY OF TRAUMA TO EYES : Yes / No

ANY TREATMENT TAKEN FOR EYE COMPLAINTS

ANY OTHER IMPORTANT INFORMATION

EXAMINATION OF EYE

	Right	Left
1. VISUAL ACUITY		
2. IMPORTANT FACIAL MUSCLES FUNCTION		
Orbicularis Oculi		
Frontalis		
Others.		
3. FASCIAL SENSATION:		
Normal		
Impaired		
Lost		
4. ANY OTHER ABNORMALITY IN FACE:		
5. EYEBROWS		
Normal		
Complete loss		
Partial loss		
Thickening of supraciliary ridge		
Nodules		
Others		
6. EYE LASHES:		
Normal		
loss		
Trichiasis		
Others		

	Right	Left
7. **Lid** :		
Normal		
Entropion		
Ectropion		
Thickened		
Ptosis		
Lagophthalmos		
Others		
8. **Lacrimal Apparatus**:		
Normal		
Acute Dacryocystitis		
Chronic Dacryocystitis		
Lacrimal Abscess		
Lacrimal Fistula		
Others		
9. **Conjuctiva**		
Normal		
Acute conjuctivitis		
Chronic conjunctivitis		
Pterygium		
Others		
10. **Sclera**		
Normal		
Nodules		
Scleritis		
Episcleritis		
Staphyloma		
Others		

	Right	Left
11. CORNEA		
Normal		
Superficial Keratitis		
Interstitial Keratitis		
Exposure Keratitis		
Band shaped Keratopathy		
Prominent Nerves		
Pannus		
Opacity		
Ulcer		
Keratinization		
Sensitivity (Normal, Impaired, lost).		
Others		
12. ANTERIOR CHAMBER		
Normal		
Depth		
Contents : Hypopyon		
Hyphaema		
Giliary Flush		
Flare		
Cells		
KPs		
Others		
13. IRIS		
Normal		
Acute Iritis		

	Right	Left
Chronic Iritis		
Iris Atrophy		
Iris Pearls		
Iris Naevus		
Anterior/Posterior synechia		

14. PUPIL

Normal		
Constricted		
Dilated		
Irregular		
Occlusio Pupillae		
Seclusio Pupillae		
Light Reaction		
Sluggish		
Normal		
Absent		

15. LENS

Normal		
Early immature cataract		
Immature cataract		
Mature cataract		
Hypermature cataract		
Aphakia		
Dislocated Lens		
Others		

16. OCULAR MOVEMENTS

Normal		
Restricted (Direction)		
Phorias		

17. TENSION

(Schiotz's Tonometer)

18. FUNDUS

(Direct Ophthalmoscopy)

Vitreous

Disc

Vessels

Choroid

Retina

Macula

Others

19. DETAIL OF IMPORTANT LESIONS: